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Corrosion Testing at Kure Beach
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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 121, NO. 1 JULY 7, 1947

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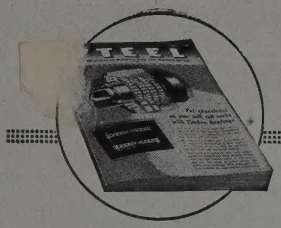


July 7, 1947

Retiring at 55

Industrial employers and employees alike soon will be asking questions about the old-age retirement plan which has been incorporated in the new contract between the Ford Motor Co. and members of CIO United Automobile Workers.

While the complete details have not been announced, it is understood that the company contributes toward pensions the equivalent of 3½ cents an hour and that the union requested that this amount be devoted to pensions instead of to pay for six holidays annually as provided in the union's contracts with General Motors Corp. and Chrysler Corp. It is expected that the plan will provide for the retirement of Ford employees on an optional basis at an age between 55 and 65 on a pension that will range between 50 and 60 per cent of the employee's average annual earnings during his period of employment.

One of the first questions asked will be why Ford workers turned down the company's offer of 3½ cents an hour for six paid holidays and asked that this amount be put into pensions. Are Ford employees more far-sighted than their contemporaries in General Motors and Chrysler plants? One possible clue to the answer is that more than half of Ford hourly-rated employees have been employed with Ford 15 years or longer. Another is that the average age of Ford employees is believed to be about 50, which is higher than that prevailing in most large industrial corporations. These factors of stability and maturity may account for the decision by Ford workers.

Other pertinent questions revolve around the principle of voluntary retirement at ages from 55 to 65. In theory, the idea that a steadily improving economy will permit workers to work fewer hours and to start working later and to retire earlier in life is extremely attractive. However, in practice employers find a great reluctance on the part of older employees to quit at 60 or 65 years of age. A majority seem to prefer to work as long as they are capable.

Does the attitude of Ford employees herald a departure from this traditional spirit of dying with one's boots on? If so, are those who seek retirement at an earlier age doing anything to cultivate interests that will occupy them wholesomely through two decades or more of retirement?

The Ford plan is another noteworthy experiment in the direction of employee security. One of its greatest hurdles will be the unpredictable whims of human nature.

° ° °

OIL IS BOOMING AGAIN: Rationing of gasoline in certain central states by several oil companies reflects an unprecedented situation in the petroleum industry. In 1945 when wartime demands were at their peak, the average daily crude oil output hit an all-time high of 4,695,000 barrels. Today, postwar peacetime demand is threatening to exceed the current average daily crude production of 5,700,000 barrels!

This spectacular demand arises from mounting automotive mileage, a marked shift to diesel locomotives on railroads and a drift from coal to oil for house heating. This expanding market for petroleum products, coupled with an attractive price for crude, stimulates oil field activity. This explains why $2 billion, or nearly half of the $4.1 billion that the petroleum industry will put into capital investments in 1947 and 1948, will go into the production end of the business. The other $2.1 billion will go into the other three divisions—refining, transportation and marketing.

Production means drilling of wells and the exploration and acquisition of prospective oil-bearing lands. It is estimated that 35,000 wells may be

(OVER)

drilled in 1947, which would establish a new record. Even this number could be exceeded if sufficient materials, particularly drill pipe, were available.

In short, the oil business is booming and it will need steel and equipment in excess of the volume that producers and builders can supply on short notice. —p. 57

* * *

WORLD NEEDS SPRINGS: First project to be completed in the $30 million modernization program of Crucible Steel Co. of America is the expansion and improvement of the Spring Works at Pittsburgh to permit an output of 1500 tons of elliptical and coil springs monthly.

This impressive capacity brings to mind the critical shortage of railway springs observed by the writer in the Far East a year ago. In railroad shops in Korea, Manchuria and Formosa stocks of spring steel had been exhausted and the only way urgently needed springs could be provided was to go out into the scrap yard and hand pick from abandoned broken sets enough sound leaves of the right size to make a new set.

Shortage of cars, locomotives and components is general throughout Europe and Asia. That is why such a large proportion of the credit being arranged by the Export-Import Bank of Washington goes to finance shipments of American transportation equipment to foreign countries. —pp. 69, 70

* * *

AS AMERICAN AS PIE: Milling as a production operation is a distinctly American development. The machines designed in this country by Eli Whitney, Simeon North and John Harris Hall prior to 1820 were direct forerunners of modern milling machines. Also the marked changes in design that attended the introduction first of high speed steel and later of carbide cutting materials have been almost exclusively American in origin.

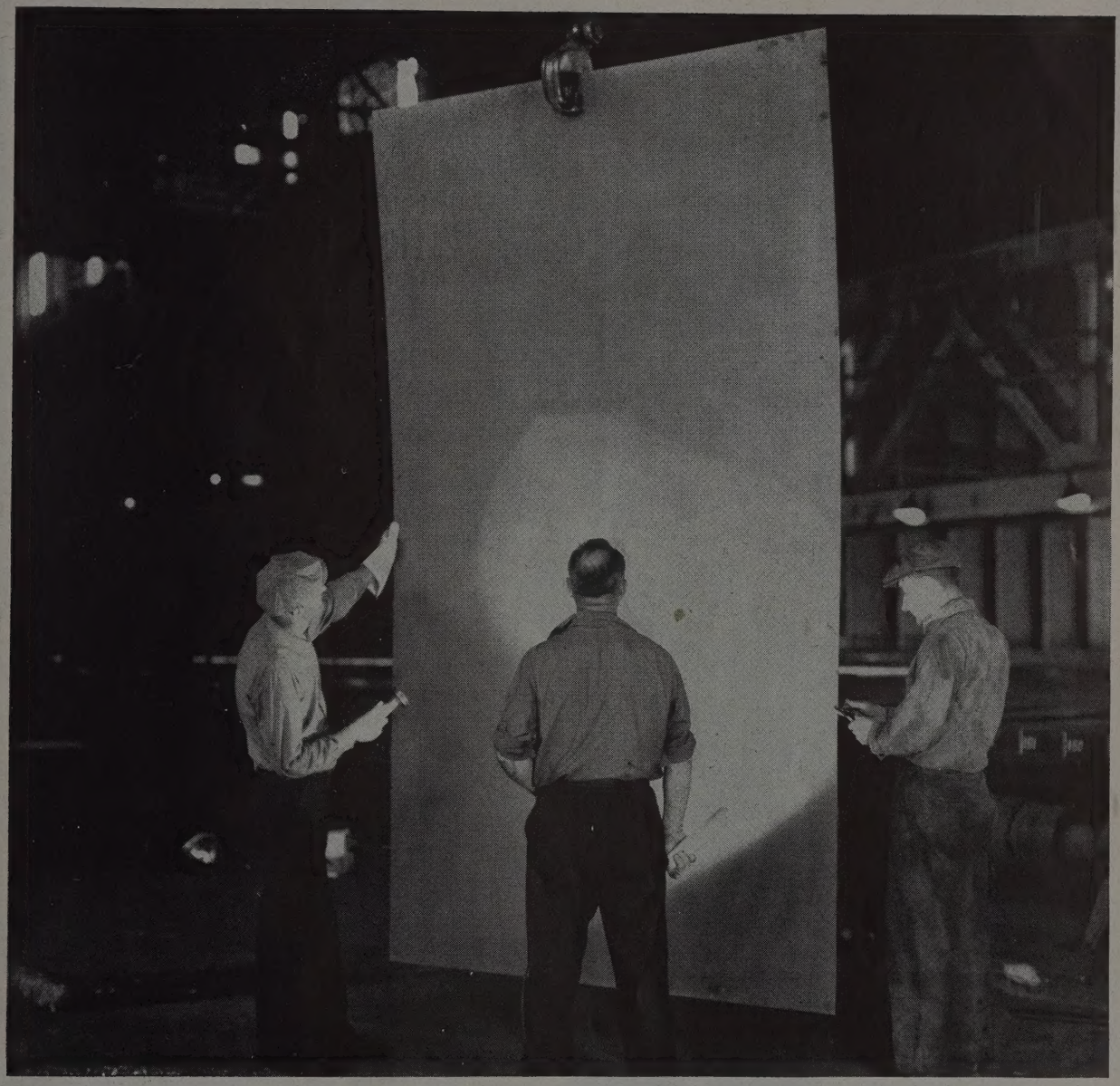
Currently major developments in milling machine design and construction stem from a desire to utilize fully the advantages of carbide cutters. During the war revolutionary machining feats were performed with coarse cutters of only one or two teeth. Stabilizing flywheels were mounted on cutter arbors. "Climb milling" came into more general use and numerous other aspects of "super" milling were introduced.

Today builders are incorporating in new machines the lessons learned from wartime experience. In doing so they may be writing the brightest chapter to date in the fascinating story of the development of American milling machines. —p. 90

SIGNS OF THE TIMES: Petition by the railroads to Interstate Commerce Commission for freight rate increases as high as 25 per cent (p. 63) constitutes the fourth rate development confronted by steel producers and fabricators since the first of the year and complicates the estimating of future costs. . . . Because the Taft-Hartley Act excludes foremen from the collective bargaining provisions of the Wagner Act, one would think that prolongation of the strike by foremen at Ford Motor Co. would be futile. However, the strike continues (p. 73) and the head of the union proposes to carry the issue into the courts. . . . A chief metallurgist, discussing significant developments in gas chemistry (p. 86) predicts "it will be only a matter of time before demand for better quality of unfinished steel will result in adoption of carbon restoration by steel manufacturers. At least one manufacturer now is turning out a limited supply of rod and bar stock which has been annealed in suitable atmospheres to restore original surface carbon content to the steel". . . . The customary dip in industrial activity that attends the observance of Independence Day this year was accentuated not only by the coal miners' vacation (pp. 78, 151) but also by the mass vacations of tens of thousands of employees in hundreds of plants. With vacations with pay now a common practice, many companies are finding it advantageous to shut down and permit all but maintenance workers to take their vacations at the same time, rather than to stagger them throughout the summer months. . . . Motordom believes an outstanding new model Oldsmobile will be introduced (p. 74) to mark next year's golden anniversary of the Oldsmobile Division of General Motors. . . . National Industrial Conference Board's survey of 93 companies shows that use of standardized purchasing, engineering and manufacturing procedures (p. 69) is one of management's most effective means of producing better products at lower costs. . . . Steel output in England is falling far short of expectations. Production in May was at the annual rate of 12,684,000 tons (p. 62), compared with an annual rate of 13,619,000 tons in May last year. . . . Alvin E. Dodd, president of American Management Association, last week told delegates to the International Management Congress in Stockholm, Sweden, that American business (p. 65) is being increasingly regarded as a "social institution with social responsibilities whose main objective is the greatest satisfaction of owners, employees, consumers and the general public."

E. L. Shaner

EDITOR-IN-CHIEF



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All sorts of gadgets were tried. Trick sinkers and attachments were devised to get the hook down where the fish could grab it. The lines themselves were coated with heavy substances to make them sink.

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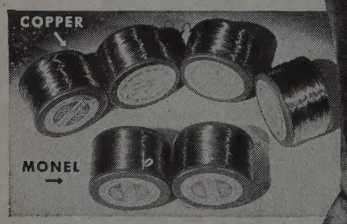

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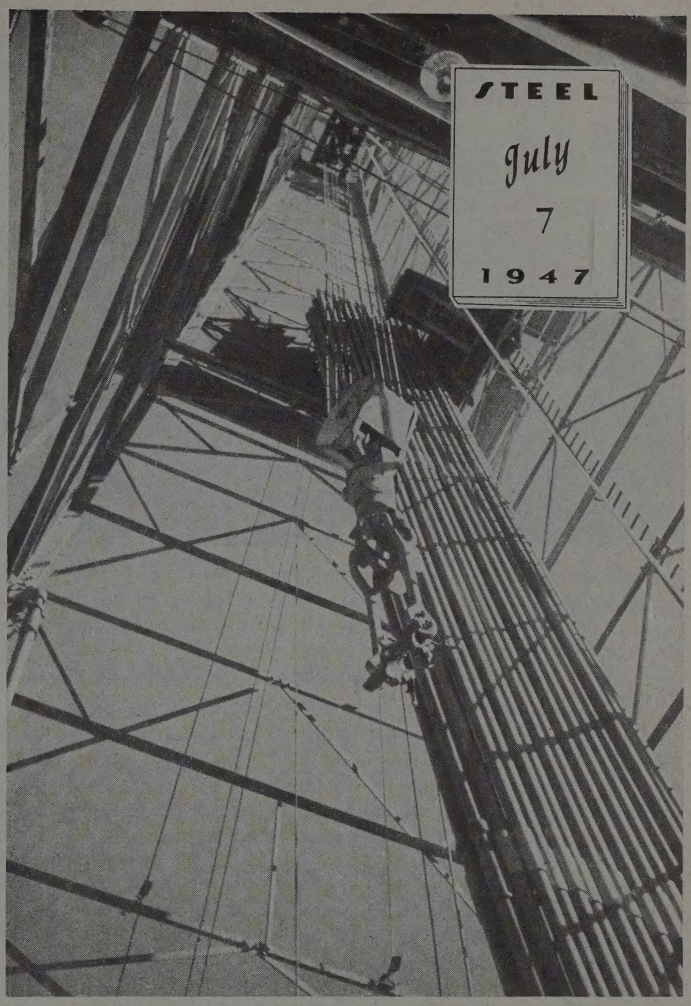
Future Bright For Oil Field Equipment

Growing demand for petroleum products pushing well drilling activity to new levels. Half of petroleum industry's capital investments in 1947 and 1948 will go for producing crude oil

By VANCE BELL
Associate Editor, STEEL



In response to a steadily growing demand for petroleum products, oil well derricks are expected to rear skyward this year at a new all-time rate, making the outlook bright for manufacturers of oil field equipment

A BRIGHT future is in view for oil field equipment makers, for demand for petroleum products is at an all-time high rate and the long-term trend points even further upward.

This presages an expansion of oil field activity, including the drilling of an increasing number of new wells, thereby promising a strengthened demand for oil country equipment and supplies.

In fact, the American Petroleum Institute, New York, says that of capital investments totaling $4.1 billion that will be made in 1947 and 1948 in the petroleum industry's four divisions (producing, refining, transportation, and marketing) nearly half, $2 billion, will be used in production, including exploration and acquisition of prospective oil-bearing lands. In the production division alone, one group of companies will spend close to a billion dollars in the two-year period, the institute added.

Need for this expansion can be seen by a comparison of crude oil production figures, which are indicative of demand. In 1945 when war demands for petroleum were at the peak, the average daily crude oil production attained a new all-time high of 4,695,000 barrels. Continuing to rise, it reached 4,749,000 in 1946, and there are predictions it will go to 5,700,000 in 1947, or 21 per cent in excess of the wartime peak.

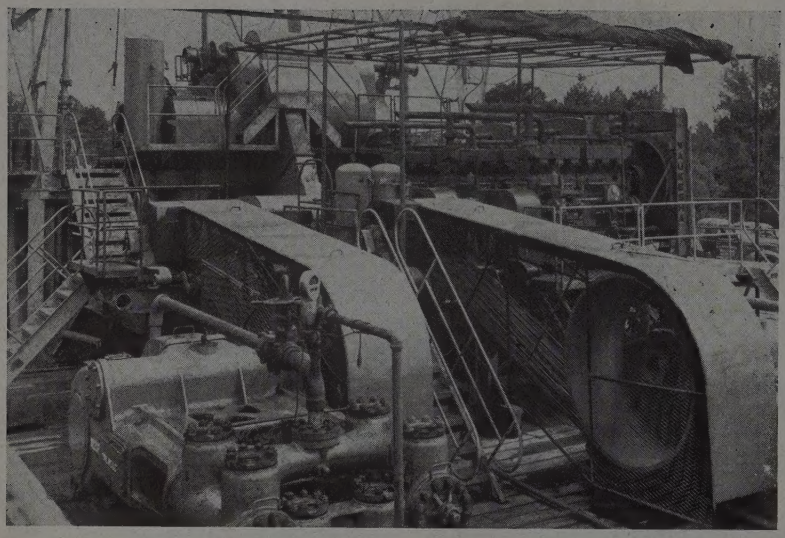
Commenting on the future demand for petroleum, the American Petroleum Institute says: "The demand for petroleum products is increasing beyond the wildest forecasters' dreams. Month in and month out we now use more petroleum than we did at the peak of the war and still more would be used if people were able to get all the automobiles, trucks, tractors, and home heating equipment they have on order.

"Several estimates are available but all seem to point to a U. S. petroleum demand of something like seven million bbls. daily by 1951," the institute says, adding that some estimates put the figure at nine million bbls. daily for 1955.

To meet this demand, more wells will have to be drilled, more pipelines built, more tankers put into operation, more refineries constructed, and more tank trucks and service stations put into use, the institute pointed out.

Present indications, according to the institute, are that total well drillings of all kinds by the petroleum industry this year will approximate 35,000, including those for exploratory purposes. This would be a new all-time peak. However, even that figure would be exceeded if sufficient materials, particularly drill pipe, were available. Total wells drilled, on the basis of figures for the year to May 31, were running 5.2 per cent ahead of the same period in 1946, the institute said. In all of 1946, 29,228 oil and gas wells were drilled.

Not only is the drilling activity increasing but the job is getting bigger, for the average depth of well is increasing steadily because the remaining reserves of petroleum are being discovered in deeper and deeper fields, the institute explained. In reaching these greater depths, however, drilling equipment is taking the job in stride, for, according to the institute, the makers of oil field equipment continue to do a splendid job in building better and longer lasting machinery, drill pipe, and supplies. Commenting on the quality, one oil man remarked that despite the higher



Rigs such as this in operation near Fayette, Miss., and other oil well drilling equipment are expected to be needed in increasing quantity with the demand for petroleum products on the upgrade. Some estimates put demand for crude oil in 1955 at 75 per cent above present all-time high. Photo, courtesy Oil Well Supply Co., subsidiary of U. S. Steel Corp.

costs of drilling equipment today the material is so much better that were it not for the higher labor costs he would be able to drill wells for just about the same footage costs as before the war.

Of considerable importance in assuring the country of sufficient quantities of petroleum to meet the steadily growing demand are exploratory operations. Despite a threefold increase in the last ten years in costs of explorations, the industry has continued its outlays for such purposes, and, in fact, these will be at record levels in the current year. In the first five months of 1947 they ran 15 per cent ahead of the corresponding period of 1946, the all-time record year when 4518 exploratory wells were drilled.

Currently, expansion in the petroleum industry is limited primarily by the steel supply, particularly casing for oil well drilling. Discussing the apparent shortage of drill pipe, one producer of tubular goods said: "It is obvious that with the price of crude oil at its high point today, everyone is desirous of drilling up their properties and cashing in as quickly as possible. This alone creates a tremendous demand for oil country tubular goods. Furthermore, the depths of wells today have increased considerably over what they were in the past, thus requiring considerably more tonnage of pipe to reclaim approximately the same amount of oil."

Discussing the present supply situation with respect to petroleum products, Eugene Holman, president, Standard Oil Co. of New Jersey, said recently there would be a tight but not critical situation in supplying both crude oil and products for the coming 12 or 18 months to consumers. "It is not because of any shortage of crude oil. It is just that the industry has not been able to drill the number of additional new wells, to provide transportation, and to build new facilities necessary rapidly enough to produce and handle present record demands for oil with its customary margin of safety," Mr. Holman pointed out.

One company directly affected by the supply of tubular goods, the National Supply Co., Pittsburgh, manufacturer of oil field machinery and equipment, added that there is no question about the insufficiency of tubular goods holding back even greater activity in the petroleum industry. Many large producers would like to extend their drilling operations but cannot obtain the necessary casing and tubing, with the result many rigs are stacked and will remain so until the situation corrects itself, National Supply Co. said. "Then, too, the production of oil calls for the extension of pipe lines and again the shortage of tubing and material seems to be a bottleneck."

Discussing business prospects, National Supply said: "From 75 to 80 per cent of the company's products are normally sold to the oil and gas industries, and our business is directly affected by the number and footage of wells drilled. Forecasts indicate more wells will be drilled in 1947 than in 1946, with an increase of footage variously estimated from 5 to 10 per cent. If these forecasts are accurate the current year will set an all-time record for footage of wells drilled. Because of drilling and exploration for oil in foreign countries, the export demand for the company's products is much greater than in the past.

"With this projected well drilling program, together with the extensive demand of the construction industry for pipe and conduit, sales of pipe and other tubular products made at our Ambridge, Pa., and Etna, Pa., plants will be limited only by the supply of steel available. The entire output of the Ambridge plant for 1947 has already been sold. It is also probable, although not so certain, that the total production of drilling and pumping equipment manufactured at our Toledo, O., and Torrance, Calif., plants will find a ready sale during this year. While our Springfield, O., engine plant may not operate at capacity, it is reasonable to expect that engine sales will exceed those of any previous peacetime year."

Another manufacturer of oil field equipment, the Cardwell Mfg. Co. Inc., Wichita, Kans., expressed optimism concerning the future. Presently, delivery date is one of the most important factors in sales, the company pointed out. In endeavoring to speed up deliveries the company continues to be handicapped by critical shortage of some raw materials and components, some of which require considerable lead time for procurement.

Halves Order Backlog

However, Cardwell has reduced its backlog of orders to 50 per cent of what it was on V-J Day. This has been accomplished through working it down by increased manufacturing schedules and by eliminating questionable orders, particularly those which had been on the books a long time. "We have long regarded a heavy backlog as unhealthy in the oil field equipment business because cancellations are most prevalent on the oldest orders as a result of changed field conditions in the long interim. Cancellations also tend to disrupt manufacturing schedules, and to keep those schedules reasonably stabilized a backlog not to exceed six months' expected production is much more desirable," the Cardwell company said.

Cardwell prices rose 5 per cent between 1939 and 1941 and remained constant throughout the war except for isolated Office of Price Administration increases obtained as a result of engineering changes in production. Since then, there was a 10 per cent increase in the spring of 1946 and a 6 per cent increase in the fall of that year. Further increases will not be necessary, Cardwell believes. "We are bending every effort to keep from raising them, although prices at present do not seem to be a deterrent to sales. Our wish is to start price reductions as soon as they are economically feasible."

Discussing the business outlook, Dresser Industries Inc., Cleveland, said "the increasing demand for petroleum products continues to be reflected in a growing volume of potential equipment busi-

ness for drilling and pipe line operations, although the current pipe and casing shortage is tending to retard projects originally slated for early completion."

Of Dresser's $51,479,000 order backlog at the end of April, $37,743,000 represented oil and gas equipment business, which has been increasing. Pointing out that a substantial increase in foreign business has been one of the most interesting developments this year, the Dresser company reported that of its backlog of orders for oil and gas equipment, foreign business accounts for $7,775,000. Discussing its foreign business, Dresser said that three of its operating companies—Pacific Pumps Inc., Huntington Park, Calif., Clark Bros. Co. Inc., Olean, N. Y., and International Derrick & Equipment Co., Columbus, O.—are selling increasing amounts of equipment to South America. "Many of our products are finding an increasing market in the British Empire, France, and the Near East," the parent company added. "Largest recent foreign sales, however, have been to the Russian government, which is buying from us sizable quantities of equipment for rehabilitation of oil fields damaged by the war; for development of new oil fields; and for expansion of natural gas service to Moscow," the company said.

Indications of Building Cost Stabilization Noted

Definite trends toward building cost stabilization have been observed by H. K. Ferguson Co., Cleveland, in the last two months, O. F. Sieder, executive vice president and general manager of the industrial engineering and building firm, announced in his semiannual report to the board of directors. For the first time since V-J Day, Mr. Sieder said, the company's cost curves reflected no rise for a two-month period.

The company is now able to purchase most basic construction materials and many items of fabricated equipment without escalator clauses, he said. Deliveries are such that construction schedules can be maintained with careful planning. Principal exceptions in the brightening picture, he stated, are in the electrical field where suppliers have not yet caught up with demand.

No indications of a recession can be seen from the market for new construction, he told the board. "The demand for new industrial engineering and building services is still so heavy that we have been forced into a policy of 'client selectivity,'" he continued, adding: "We are limiting our new business to filling plant requirements of old customers and to those fields in the chemical process industries where we have specialized know how and experience."

New Aluminum Alloy Increases Speed And Efficiency of B-50 Superbomber

EXTENSIVE use of the comparatively new high-strength aluminum alloy known as 75-ST, supplied by Aluminum Co. of America, in the wings of the Boeing B-50 superbomber, successor to the B-29, has resulted in a wing structure which is 650 pounds lighter than that of the B-29, 16 per cent stronger and 26 per cent more efficient.

The alloy makes possible lighter-gage skin and extrusions than those of the former alloy, 24-ST. The metal is used on both upper and lower wing surfaces and upper spar chords and required some modifications to the basic wing covering splices, connections of spar webs to spar chords and connections of wing coverings to spar chords.

Test flown for the first time last month, the B-50 demonstrated it will cruise 27 per cent faster (300 mph) than the B-29 at equal ranges, cruise approximately 50 mph faster than any other bomber capable of flying equivalent distances, fly at top speed approximately 400 mph, with maximum range greater than the B-29 Superfortress.

Engines are four radial 3500-horsepower Pratt & Whitney Wasp Majors, developing 59 per cent more power than the B-29 engines, and said to be the largest reciprocating-type engines ever used on a production airplane. Each of the 28-cylinder engines drives Curtiss electric reversible-pitch propellers of the four-blade type, with electric deicers, and each engine incorporates a General Electric exhaust-driven turbosupercharger to maintain power at high altitudes and reduce fuel consumption.

More powerful engines necessitated a new tail design for the B-50 to preserve directional stability at low airspeeds with unsymmetrical power. The vertical stabilizer is 5 feet higher than that of the B-29, and the vertical fin is hinged to allow it and the rudder to be folded onto the stabilizer when entering hangars.

Present, Past and Pending

■ EXPORT CONTROLS PLACED OVER FREIGHT CARS

WASHINGTON—Railroad freight cars were placed under export control June 30 to prevent foreign shipment from interfering with urgent domestic needs, Office of International Trade, Department of Commerce, announced. Domestic orders on Apr. 30 totalled 99,346 cars, OIT added.

■ MAY PIG IRON OUTPUT TOTALS 5,029,496 TONS

NEW YORK—Blast furnaces operating at 91 per cent of capacity in May produced 5,081,131 net tons of pig iron, ferromanganese and spiegeleisen, bringing the five-month total to 24,670,519 tons, American Iron & Steel Institute reported. Pig iron accounted for 5,029,496 tons of the month's output and 24,414,346 of the year's.

■ 1947 WASHING MACHINE SALES SHOW 119% GAIN

CHICAGO—Sales of standard-size household washing machines in the five-month period ended in May aggregated 1,436,629, an increase of 119 per cent over the 645,073 sold in the like period of 1946, according to American Washer & Ironer Manufacturers' Association. Ironer sales totaled 201,942, compared to 39,291 in January-May, 1946. Washer sales in May, 1947, were 311,419; ironer sales, 47,343.

■ GERMAN IRON, STEEL EXPORTS RESTRICTED

DUSSELDORF, GERMANY—Monthly export allocation of 24,000 tons of iron and steel products were established for the quarter ended June 30. Only 3000 tons was allowed to be exported in bulk forms, the remainder being incorporated in machinery and other finished goods. Preference for German exports was given to countries producing little iron themselves.

■ WAGE DEMANDS AGAINST PRATT & WHITNEY DROPPED

HARTFORD, CONN.—Members of United Electrical, Radio & Machine Workers Local 251-CIO dropped demands for a 15 cents an hour wage increase when Pratt & Whitney Division, Niles-Bement-Pond Co., showed confidential operating figures to the union. Six paid holidays were granted, however. Union termed P & W's action a "big step forward" in labor-management relations.

Unions To Defy Labor Reform Act

Period of controversy, resembling that which followed passage of Wagner Act 12 years ago, predicted. Labor to fight law on legal, political and economic fronts

Members of the CIO Executive Council meet in Washington to study implications of the new labor act and to receive a complete analysis of the law from the union's legal staff. Left to right: Emil Rieve, president of the Textile Workers Union; Jacob S. Potofsky, president, Amalgamated Clothing Workers; Philip Murray, president of the CIO and of the United Steelworkers; Lee Pressman, CIO general counsel; R. J. Thomas, vice president of the CIO and of the United Automobile Workers. NEA photo

A YEAR or two of controversy over the provisions of the Labor-Management Act of 1947 (Taft-Hartley) appears to be brewing. Labor union leaders have announced their intention to fight the new act on three fronts—legal, economic and political.

The picture today is the parallel—in reverse—of 1935 when the New Deal Congress passed the National Labor Relations (Wagner) Act. Hailed by union labor as its Magna Charta, the Wagner Act was termed "revolutionary" by management. Scores of court actions were brought to contest it. Many of these reached the Supreme Court, which in a large majority of cases returned decisions favorable to the prolabor administration of the act.

Period of Defiance Expected

The new law similarly is expected to usher in a considerable period of defiance by the labor unions. Some students of labor relations believe President Truman was correct in his veto message prediction that the act would "cause more strikes, not fewer," particularly in the months immediately ahead. Most of them believe that the acidulous tenor of his message has contributed powerfully toward assuring this prediction will be carried out. The denunciations hurled at the bill and at Congress for supporting it are bound to be repeated by labor partisans for many months to come.

However, majority opinion among those who make labor policy their business is that the effects of the new act will be beneficial in the long run. Some time will be required for labor's defiance to spend itself and some disorder may be expected until the law wins a considerable measure of acceptance by labor.

Indications are that this summer and fall will be the crucial period. The first test, it is expected, will come in coal. Majority opinion is that the new law will not of itself prevent a coal strike. But, assuming that the President makes fullest use of the "National Emergencies" section of the Taft-Hartley Act, he can do a great deal to take the steam out of the strike threat. He can declare a national emergency and postpone the strike for 80 days during which he can inform the public as to the issues involved and bring the force of public opinion to bear. This first test, it is hoped, will reveal whether any more drastic legislation than the Taft-Hartley Act is necessary to safeguard the country against emergency strikes.

In the meantime, action on more drastic proposals is being held in abeyance; the main bill so far put in the hopper was written by Rep. Howard Smith (Dem., Va.), co-author of the Smith-Connally Act. The new Smith bill would continue the power of the President to operate mines and other property under seizure.

Numerous work stoppages may take place this fall because of expected inability of the National Labor Relations Board to build up in the short time this side of Aug. 22, the Taft-Hartley Act's effective date, a field force capable of handling the elections that the unions will demand under the new law. After that there can be no more bargaining for the closed shop, while the unions can have a union shop only if a majority of the employees indicate such a wish by secret ballot. At least 50,000 labor-management contracts that will come up for renewal between Aug. 22 and the end of 1947 involve this issue and it is feared that elections will be asked for in the great majority of these cases. To be able to handle these elections under the law, the National Labor Relations Board must recruit a great many competent field examiners—and this is no easy assignment. Also, the NLRB must receive an adequate appropriation from Congress to support such an organization.

Many of the controversial features of the new law will be fought out in the courts and will not prove disturbing to actual production and employment. Both the AFL and the CIO have decided to fight the ban on political expenditures. Numerous other questions will need court clarification—as whether a union can include the subscription price of a union newspaper in the membership dues, or whether such subscriptions must be handled separately.

One of the good features of the Taft-Hartley Act, in the opinion of those who think employers should have the same sort of treatment that is given to the unions, is the fact that opinions and decisions no longer will be written by a labor-minded review board and handed to the National Labor Relations Board members for their signatures. While the board's general counsel has vast powers under the new act, he has no control whatever over the trial examiners or of the legal assistants to the individual members of the board. Thus there is a complete separation between the investigating and prosecuting or "quasi-judicial" powers of the board as a whole. The general counsel now has total responsibility for what happens in the board's re-

gional offices and is answerable to Congress under this category. It should be difficult under this setup to mask the board's policies and behind-the-scenes acts from the public.

Another good feature is the change from the previous situation in which labor always has received preferential treatment from the board. Under the old Wagner Act all the rights were enjoyed by the unions, so that the atmosphere in the board generally was one of favoring the unions and dealing at arm's length with employers. Labor authorities who have studied the new act carefully predict it will quickly remedy that condition. Now that employers have rights under the law they automatically will get more favorable treatment from the entire organization of the NLRB.

GE Bolsters Staff with 750 Graduates from Colleges

General Electric Co., Schenectady, N. Y., has bolstered its scientific staff by more than 750 engineers, physicists, and chemists, recent graduates of 150 U. S. colleges and universities.

Expansion of the company, coupled with effects of the wartime shortage of graduates, led to selection this year of twice the normal number of engineers.

In addition, more than 100 graduates in business administration, accounting, and liberal arts have been selected from colleges and universities for training in accounting and financial work.

Steep Rock Mines Company Reports New Ore Reserves

Increase of almost 150 per cent in iron ore reserves and an operating profit of more than a million dollars are highlights of the annual report of Steep Rock Iron Mines Ltd., Toronto, Ont., Canada.

The recently issued report covers the eight months ended Dec. 31, 1946, to conform to a decision to change the company's fiscal year-end from Apr. 30 to Dec. 31.

The report says that while the "B" ore zone on the company's property is expected to reach its 1947 production goal of 1,200,000 tons, operations there have been far overshadowed by recent diamond drilling results on the "A" zone. Last year's shipments of 830,409 gross tons were sufficient to place the "B" zone thirteenth among the Lake Superior district's 150 producing mines.

Of the proved and probable ore reserves of 72,481,678 tons as of May 1, the "A" body alone, to a 575-ft depth, accounts for 53,537,784 tons, says M. S. Fotheringham, vice president and general manager. This, he adds, puts enough ore in sight to maintain the present production rate for more than 50 years.

Coal Mine Shutdown, Holiday Observance Cause Sharp Break in Steel Operations

COAL shortage caused by the miners' holiday, combined with observance of the Fourth of July and vacation shutdowns, caused national steelworks operations to drop 23½ points to 73 per cent of capacity last week. The decline breaks a period of 25 consecutive weeks in which steel production has exceeded 90 per cent of capacity and marks the fourth time in 20 months that steel operations have been hit by idleness at the coal mines.

The current problem of conserving coal and coke sets back the mills' attempts to restore balance between supply and demand for steel. In the first six months of 1947, the industry produced more than 42 million tons of ingots and steel for castings, a peacetime record. Continuance of this rate was expected to bring balance in supply and demand of most products by the end of the year.

Mills located near the northern Appalachian coal fields were hardest hit by the mine shutdown. Pittsburgh district lost 42 points to 58.5 per cent of capacity, Youngstown dropped 53 points to 40 per cent, Cleveland declined 58 points to 33 per cent and Wheeling 30.5 points to 63 per cent.

Steel plants farther removed from the coal fields normally carry larger stocks and the immediate effects of the mine closing on their operations were less severe. However, should the miners fail to return to work July 8 at the end of their vacation period, practically all mills will have to begin curtailing their operations.

The industry's coal stocks were estimated to be equivalent to an average of 37 days' operations at the beginning of the walkout.

A. F. Davis Undergraduate Welding Awards Presented

Cash prizes in the 1947 A. F. Davis Undergraduate Welding Award Program have been presented by the American Welding Society, New York, to two individuals and to two school publications.

First prizes of $200 each went to John W. Price, a junior at Rose Polytechnic Institute, Terre Haute, Ind., for his paper entitled "Atomic-Hydrogen Arc Welding," and to the school magazine *Rose Technic*, in which the prize-winning article was published.

Second prizes of $150 each were awarded to Howard Sanders of Cornell University, Ithaca, N. Y., for his prize-winning paper entitled "Welders in Diving Suits," and to the *Cornell Engineer*, university magazine which published his article.

Coal pile of the Clairton Works of Carnegie-Illinois Steel Corp., near Pittsburgh, dwindles rapidly as coal receipts stop. Works normally uses 30,000 tons daily and keeps a stockpile of 350,000 tons. The shortage has caused a sharp curtailment in steelworks operations. NEA photo

British Steel Output Falls Far Below 1947's Anticipated Rate

Contrary to plans for higher production this year than last, England's steel ingot output in May was at an annual rate of almost one million tons less. Steel shortage may prevent increased export of cars and trucks

BIRMINGHAM, ENGLAND

CURRENT steel production in England is falling far short of the target set up for the industry at the beginning of the year when it was hoped at least a half million tons more of steel ingots could be produced in 1947 than were poured in 1946. Output for the first half of the year is below that for the 1946 period, weekly average production in May being 243,900 tons or an annual rate of 12,684,000 tons, compared with an annual rate in May, 1946, of 13,619,000 tons.

It was clear at the beginning of the year that producers had to face a difficult 12 months but events turned out worse than anticipated due to the fuel crisis in the early months. Certain groups of consumers are now enjoying 100 per cent priorities to the detriment of industries outside the favored list.

Steel Short for Automobiles

Makers of automobiles in Britain are short of steel and unless the industry is treated more generously in allocations by the government the drive for export trade may suffer another setback. This industry, which has played a leading part in rebuilding overseas business since the war, has had an export quota for automobiles of 50 per cent of production; one-third of all truck output has been designated for foreign shipment. Recently the government requested the industry to allocate 75 per cent of its automobile production for overseas markets. Such an increase, it was agreed, would lead to difficulties in the home market, but manufacturers, recognizing the continuing urgent need for exports, have compromised on a 60 per cent figure; at the same time the heavy vehicle manufacturers have volunteered to raise their export quotas to 40 per cent. If the cut of 30 per cent in steel allocations for the summer months is maintained, however, these increased foreign percentages may not result in an expansion of overseas sales. The output will fall about 25 per cent, or about 1500 cars a week.

Imports of steel by Britain are only a fraction of prewar volume and the demand for larger tonnages is pressing. Re-rollers are still hopeful the American steel industry will be able to increase shipments of semifinished steel later this year. Meanwhile somewhat larger tonnages have been coming from Canada and Australia, but supply falls far short of requirements. Order books for all classes of steel are already full and even with an immediate increase in supplies a long period must elapse before inventories can be built up. There appears little chance of balance of supply and demand being established this year.

The fuel position is easier and industrial users, having been warned of a shortage again next winter, are trying to build up stocks. There is still insufficient coal to warrant blowing in any more blast furnaces. Basic pig iron output has increased to a more satisfactory level, however, but in some cases this has been at the expense of the foundry iron trade. Serious scarcity of foundry and special irons is restricting production of light castings, for which at the present time there is an enormous demand in the building trades.

Plans to convert plants from coal to oil were suspended recently by the government, Fuel Minister Shinwell stating that conversion projects already approved would increase annual oil consumption by the middle of next year by five million tons, equivalent to an annual saving of eight million tons of coal. This amount was the maximum that could be achieved in that time and the government has decided against any general extension of conversion schemes for the time being. The matter will again be considered in the fall when the trend of coal output is more clearly established. Meanwhile, to provide for conversion cases awaiting consideration, arrangements to import an additional million tons of oil a year are being made.

A further increase in freight rates on British railroads is threatened. If this materializes, an upward revision in prices of steel will probably be forthcoming.

Belgium, Luxemburg Report Steel Supply Improvement

LIEGE, BELGIUM

Output of iron and steel in Belgium and Luxemburg is on the increase, April level in Belgium being the highest since the war and Luxemburg nearly reaching its postwar record. Coal and coke supplies to the industry have been adequately maintained with a resulting improvement in iron and steel deliveries for both the home and export markets. The volume of export business,

GERMAN PLANT STRIPPED: American and British occupation authorities have discovered scenes like this in the Soviet-occupied zone of Germany where this industrial plant has been completely stripped by the Russians of machine tools, scrap iron and even bricks. Although some factories are operating, scores of others lie in ravaged scrap heaps. NEA photo

particularly, is well sustained although competition from the United States is being increasingly felt. Delivery dates for export extend about three months, compared with six months recently. It is beginning to be realized that the large volume of demand that has been a feature of the markets will soon tend to decrease.

Export prices for northern Europe are now quoted in pounds sterling per gross ton and the prices, fob Antwerp, converted into dollars, are: Billets, $88; merchant bars, $94; structural steel, $93; wire rods, $97; plates and hoops, $102.

With large tonnages of French iron ore imported into Belgium, the recent French railroad strike might have had serious consequences. The strike, however, was of too short a duration to have any effect and stocks at mills are on the whole relatively large. Coming almost on top of the French strike, was a strike of 25,000 Belgian workers in the industrial district of Charleroi, who asked for a raise of 500 francs ($11.40) per month to meet the high cost of living. This strike, it is feared, may have an unfavorable effect on the negotiations of the Conference Nationale du Travail, which is trying to settle many labor problems currently.

The proposed customs union between Belgium and Luxemburg on the one hand and the Netherlands on the other is still much discussed. The plan which has been established is still open to suggestions for amendments from industrialists.

Belgian manufacturers of railroad stock have received confirmation from France of the contract for 5000 railroad cars for the French roads and have begun construction on orders for 10,000 cars for the Belgian roads. It had been proposed before the war that all Belgian railroads be electrified and this proposal is again being considered.

Canada Decontrols Prices On Lead, Copper and Zinc

Price decontrols have been announced in Canada on lead, copper, and zinc, leaving under control only primary and secondary tin alloys containing more than 75 per cent tin, according to a report to the Department of Commerce.

Ceylon Removes Limits on Imports of Metal Products

License-free imports of iron and steel plates of all kinds, iron and steel wire, machine tools, agricultural machinery and printing type are now permitted by Ceylon, according to the Department of Commerce, based on a late cable from American representatives there.

New Proposal for Higher Freight Rates Complicates Cost Estimating

Railroads seek freight rate increases as high as 25 per cent in addition to other increases now under consideration by ICC. Any increase in transportation charges tends to narrow markets for finished products affected

UNCERTAINTIES regarding future transportation costs increased last week with the announcement that the nation's railroads are asking the Interstate Commerce Commission for freight rate increases as high as 25 per cent. The petition was to be filed late last week.

Industrialists have been hampered for several months in mapping production and sales programs by their inability to estimate closely what freight rates they will have to pay a few months hence. A basic economic principle is that every increase in freight rates tends to narrow the market of products affected. The increase, if granted, would increase materially costs of gathering raw materials as well as distribution costs of the finished products.

Since the first of the year, iron and steel producers and fabricators have been faced with the following four freight rate developments: On Jan. 1, less-than-carload freight rates were increased 25 per cent in Official Territory. An additional 25 per cent increase in lcl rates on the exceptions list of manufactured products, including iron and steel products, was scheduled to become effective June 20 but was suspended just prior to the effective date. This latter proposal overhangs the iron and steel industry as a threat to raising rates on their products to the fourth class level and making them subject to subsequent actions on fourth class rates. For instance, the Supreme Court recently upheld the ICC in ordering an increase in class rates of 10 per cent in the northern territory and a decrease of about 10 per cent in the southern territory. Under the present classification, the exceptions list of manufactured iron and steel products would not be subject to these latter changes.

Railroads in Official Territory have proposed an increase in rates on all lcl shipments in first, second, third and fourth classes, effective July 20. This petition has been given a docket number by the ICC for hearings. This increase would be on a mileage basis and would range from 10 per cent on long hauls to 110 per cent on short distances.

The latest proposal would provide the following general increases: Within the eastern territory, 25 per cent; southern territory, 15 per cent; western territory, 15 per cent; and interterritorially between southern and western territories on the one hand and the eastern territory on the other hand, 25 per cent, and between the southern and western territories, 15 per cent. The following specific provisions for increases are included in the new proposal on a carlot basis: Products on the manufactured iron and steel list, semi-finished steel, pig iron, iron and steel scrap, a maximum of 7 cents per 100 pounds but not in excess of $1.40 per ton, net or gross as rated;

Iron ore, 15 cents per ton on all rates;

All bituminous coal, 15 cents per ton, except tidewater export which would be increased 25 cents;

Limestone, a maximum of 20 cents per ton;

Coke, where present rate is 75 cents or less, 10 cents per ton; where present rate is 76 cents to and including $1.50, 20 cents; where present rate is over $1.50, 30 cents.

Switching charges would be increased 25 per cent in Official Territory and 15 per cent elsewhere.

Handling charges on iron ore at lower lake ports would be increased 10 per cent.

Transportation experts cannot forecast at present what the probable action by ICC will be on these three newest proposals or how they will bring conflicting provisions into balance. The latest proposal for increasing the class rates would lift those rates beyond 200 miles above the special lcl scale originally proposed to become effective July 20.

Spanish Bearing Factory To Use American Machinery

A joint Spanish government-SKF factory for producing ball bearings and roller bearings, will use some automatic machinery from the United States, according to a report on the project from American diplomatic sources in Spain.

The plant is to be constructed near Madrid. Management will be Spanish. Technical advisors will come from Sweden, and also some one-fourth of the capital in the form of machinery. Production will be limited to some 25 types of bearings commonly used in Spain.

Three Spanish factories already making bearings will continue in operation, as it is expected that two years will be required before production starts.

New Tool Ordering Stimulated As Customers Beat Price Rises

Dollar volume of tool sales rose to highest point since last October, although number of units sold was relatively low. Cancellations up 174 per cent over previous month in face of June price advances

DOLLAR volume of new firm ordering of machine tools during May reached the highest point since last October, exceeding the reported amount for April by almost 10 per cent, the National Machine Tool Builders' Association, Cleveland, recently reported. The spurt in activity was, however, in a large measure caused by increases in some machine tool prices effected last month. Purchases generally were for the larger and more expensive machines, unit volume of sales declining during the month to the lowest number, with the exception of April, in the postwar period.

Shipments, estimated for the entire industry, amounted to $25,791,000, a decline of 4 per cent from the April total, and were at the lowest point since September, 1946. Shipments by companies reporting to the association exceeded by a substantial margin new orders as reported by these companies, and cancellations, which in May were 174 per cent greater than in April, were the highest in dollar volume since October, 1945, and the greatest in units since August, 1945. Net result is a decrease in unfilled order backlogs, which have shown relatively steady decreases for about a year. The backlogs are still substantial, however, and are providing sufficient incentive to sustain the present level of operations for some months. Inequities in the distribution of these backlogs, however, are cause of some concern in the trade, many tool builders being forced to take on contract work or diversify to other products to keep war-expanded facilities and larger labor forces operating at high levels.

Foreign Ordering Drops

Foreign ordering, up to now a bright spot in new tool demand, declined last month, accounting for only about one-fifth of reported new orders from a five-month average of slightly more than 25 per cent. Shipments to foreign purchasers maintained relatively the same proportion to total shipments as they had in earlier months of the year.

Some disintegration of the export market is looked for as machine tool industries in several foreign countries—notably England, Italy, Czechoslovakia, France and Sweden—revive from the effects of the war. To stimulate preference for American-made machine tools numerous companies have foreign tours of high-ranking officials planned. The National Machine Tool Builders' Association, too, has made a special effort in its advance publicity for the September show at the Dodge-Chicago plant to interest foreign prospective buyers in American tools, success of these efforts being indicated by the large number of registrations already received from overseas.

Discount on Surplus Tools For Resale Raised by WAA

War Assets Administration has increased its discount on surplus standard general purpose machine tools purchased for resale by machine tool rebuilders, manufacturers, exporters and dealers from 12½ per cent to 17½ per cent. The increased discount, applying to fixed price tools generally considered in long supply, was authorized in a summary of procedures and instructions on the sale of machine tools sent to all WAA offices.

In the case of short-supply, easily sold tools, no discount or commission will be allowed during the first ten days of a sale to commercial buyers. Regional directors, according to the new instructions, will determine short-supply items in their regions. Formerly this determination was made by a national list.

The new discount, worked out in cooperation with dealers, it is hoped, will act to allay some of the recent criticisms charging dealers with failure to devote enough sales effort to the disposal of long-supply tools. The commission (12½ per cent) to "approved dealers" for effecting sales will remain the same. Effective July 1, WAA further announced, no applications for approved dealer agreements are being executed.

Tools tagged by the armed forces for the strategic reserve, according to the

STUDENTS ON TOUR: The Midwest, from Denver to Milwaukee, was turned into a classroom for 75 students and faculty members of the Colorado School of Mines, Golden, Colo., recently as they made a 12-day tour of mines and industrial facilities in the area. They inspected coal and lead mines, refineries, smelters, zinc, brass and glass plants, steel works, including Carnegie-Illinois Steel Corp.'s Chicago district works, Milwaukee's Allis-Chalmers Mfg. Co. plants and the Union Pacific's Omaha shops. Above they watch a buffer lathe at the Union Pacific shops. Left to right: A. J. Johnson, railroad representative; Prof. H. O. Davidson, assistant professor of mining engineering; A. C. Levinson and Jose Elortegui, students; and Prof. C. B. Carpenter, professor of metallurgy at Golden

new instructions, will be sold if shipping instructions have not been received from the interested branch and if a certificate is submitted by the purchaser stating the tool will be used for civilian production in the domestic economy.

Current inventories of surplus machine tools total more than a half billion dollars, WAA stated, adding that disposals to date amount to $645 million in acquisition cost, with a recovery rate of nearly 40 per cent.

WAA Announces Completion Of Plane Disposal Program

With the disposal of approximately 65,000 surplus aircraft since V-E Day, this activity becomes the first major War Assets Administration operation to be virtually completed. Efforts of WAA will now be turned toward liquidating nearly $775,329,000 worth of aircraft components, with plans approved to have this inventory sold by July 1, 1948, the agency announced recently.

Of the 65,000 planes sold by WAA, about 35,000 were of types which could be certificated for civilian flight use; the remaining 30,000 were strictly tactical types, unusable in civil aviation and were largely sold for scrap and salvage. Recovery from the reported original acquisition cost of more than $5 billion was somewhat more than 8 per cent for usable planes and about one and a half cents a pound for tactical planes.

The surplus planes which had civilian uses included approximately 3775 liaison craft, 900 utility cargo planes, 900 light, 1300 medium and 450 heavy transports and 11,915 primary, 8670 basic and 4775 advanced trainers. On the basis of a Civil Aeronautics Administration report that total aircraft registration on Apr. 1 was 92,247 planes, more than one-third of the planes in current use are from surplus stocks.

$1,500,000 Tool Sale Begun By Cleveland WAA Office

Approximately 500 machine tools, which originally cost the government over $1,500,000, go on sale July 7 from War Assets Administration stocks in Cleveland as an intensive sales drive in July, August and September gets under way. The accelerated program has as its goal disposal at a rate of $25 million per month, an all-time high sales quota.

Included in the first offering will be well-known makes of boring machines, gear cutters and shapers, degreasers, drill presses, lathes, automatic chuckers, automatic screw machines, lapping machines, grinders, milling machines, tapping machines, etc. The sale will last through July 21.

U. S. Business Gaining Social Conscience, World Management Conference Hears

BUSINESS in America is being increasingly regarded as a "social institution with social responsibilities whose main objective is the greatest satisfaction of owners, employees, consumers and the general public," Alvin E. Dodd, president, American Management Association, and a U. S. delegate to the International Management Congress, told the latter group at its meeting in Stockholm, Sweden, last week.

Summarizing American Management's strides since the last congress in 1939, Mr. Dodd said progress has been most marked in labor relations, use of non-wage incentives to productivity, improvement of administrative techniques, education for management and employee training. Vast improvements have also been made in quality control, he added.

A lag in human relations has occurred despite advances that have been made in other fields, he asserted. To align business policy more closely with the interests of other groups and the economy as a whole, he said American business is working toward five particular goals: An increase in the status of management, integration of business with the rest of the community, abandonment of short-sighted and emotional attitudes, continuation of the rate of technological progress and the achievement of a competence in human relations equal to that in technical development.

Discussing labor relations, he acknowledged that there still remain areas of disagreement on motives in management-labor relations. Some authorities, he said, hold that management is interested in the employees of the company while the union is interested in the employees of the industry. Another view, he pointed out, is that management is interested in the maximization of profits and unions in better living standards. Despite recurring problems in the field of labor relations and strenuous resistance to invasion of management prerogatives by labor, co-operation with labor and improved personnel practices outside the collective bargaining area "is being promoted," he asserted.

Looking ahead to future trends in management's effort to increase production, he predicted that factories of the future will be more completely controlled in layout, temperature, humidity, sound and light to enhance working efficiency, but the economies of large-scale production appear less certain in view of complexities of management and employee relations which arise. In his opinion more factories will be built in the future to supply expanding needs rather than larger factories.

Calendar of Meetings . . .

July 7-12, First Annual Store Modernization Show: Grand Central Palace, New York. Managing director of the exposition is John W. H. Evans.

July 16-18, Industrial Diamond Association of America: First convention, Book-Cadillac Hotel, Detroit.

July 16-18, American Society of Civil Engineers: Summer convention, Hotel Duluth, Duluth. Society headquarters are at 33 W. 39th St., New York.

July 16-24, American Road Builders' Association: Road show, Soldier Field, Chicago. Association president is J. T. Callaway, International Bldg., Washington.

Aug. 21-22, Society of Automotive Engineers: West coast transportation and maintenance meeting, Biltmore Hotel, Los Angeles.

Aug. 22-23, Institute of Scrap Iron & Steel: Mid-year convention, French Lick Springs Hotel, French Lick, Ind. Executive secretary is Edwin C. Barringer, Normandy Bldg., Washington.

Aug. 28-Sept. 13, British Engineers' Association: Engineering and marine exhibition, London. Association headquarters are at 32 Victoria St., London, S. W. 1.

Aug. 30-Sept. 13, Association Des Ingenieurs: Centenary exposition, Liege, Belgium.

Sept. 1-4, American Society of Mechanical Engineers: Fall meeting, Hotel Utah, Salt Lake City, Utah.

Sept. 8-12, Instrument Society of America: Second national instrument conference and exhibit, Stevens Hotel, Chicago. Richard Rimbach, 1117 Wolfendale St., Pittsburgh 12, executive secretary.

Sept. 14-20, Eastern States Exposition. Industrial Arts Bldg., Springfield, Mass. General manager is Charles A. Nash.

Sept. 17-18, Society of Automotive Engineers: Tractor meeting, Hotel Schroeder, Milwaukee.

Sept. 17-26, National Machine Tool Builders' Association: Machine Tool Show, Dodge-Chicago plant, Chicago. Machine Tool Congress in connection with show to be held in various Chicago hotels. Association headquarters are at 10525 Carnegie, Cleveland.

Sept. 22-25, Association of Iron & Steel Engineers: Annual meeting, Hotel William Penn, Pittsburgh.

Oct. 2-4, Society of Automotive Engineers: Autumn aeronautic meeting, Biltmore Hotel, Los Angeles.

Oct. 6-8, American Society of Mechanical Engineers: Petroleum mechanical engineering conference, Houston, Tex.

Oct. 15-18, Electrochemical Society: Boston Congress, Copley-Plaza Hotel. Society secretary is Colin G. Fink, 3000 Broadway, New York.

Oct. 16-17, National Conference on Industrial Hydraulics: Sponsored by Armour Research Foundation and Graduate School of Illinois Institute of Technology. Hotel Continental, Chicago.

Oct. 18-24, American Society for Metals: 29th annual national metal congress, Chicago. Society headquarters are at 7016 Euclid Ave., Cleveland.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

General revenue bill to be submitted to House next January beginning to take shape. Further corporate and excise tax relief contemplated. Committee considers federal sales tax to be known as War Debt Retirement Tax

SHAPE of the general revenue bill to be submitted to the House by the Ways and Means Committee next January is beginning to solidify. It will give further corporate and excise tax relief. It will reduce gift and inheritance taxes. It will permit separate returns on personal incomes in community property states. It probably will eliminate double taxation by permitting the individual to take a credit for dividends received. There will be no increase in personal exemptions as this would relieve too many earners and hence unduly weaken the basis of the income tax system.

The committee now is about to reconsider all existing tax exemption provisions—as those applying to income from co-operatives and from property held by religious, labor and other organizations. It can be stated definitely that much of this income—running into billions of dollars annually—will be taken out of the exempt class.

Although the committee realizes that there is wide hostility to the idea of a sales tax, it seriously is considering a tax of this type to be known as the War Debt Retirement Tax.

The committee also is sounding out the idea of creating a new relationship between income and excise taxes. Income taxation collections drop off too much in hard times and past records are being studied to determine whether a broadened excise tax system might be relied on to carry a greater share of the load—in both good and bad times—in the future.

In introducing a bill to make effective next January the income tax reduction which Congress intended to make effective July 1, Chairman Harold Knutson (Rep., Minn.) of the Ways and Means Committee, took sharp issue with the President's objection to a tax reduction at the present time on the ground that it would be inflationary.

"The President was in favor of higher wages but against a reduction in taxes. Yet everybody knows that a tax reduction is less inflationary than an increase in wages; when you increase wages you get higher prices and that is inflationary," said Mr. Knutson.

Sweden Limits U. S. Trade

An arrangement just concluded between Sweden and the United States Department of State may be the forerunner of similar arrangements with other countries—at least until such time as world trade jells into the eventual postwar "normal" pattern. The Swedes last year got into difficulties due to their heavy purchases in America; coming out of the war they bought just about everything we had to offer. In a 4-month stretch this trade drained off one-third of their gold reserve. So the Swedes sent a mission to Washington to discuss cutting their expenditures in the United States but without discriminating against our goods.

CO-ORDINATOR: George C. McGhee, special assistant to William L. Clayton, under secretary of state for economic affairs, has been appointed co-ordinator of aid to Greece and Turkey. NEA photo

The arrangement worked out is as follows: 1. The Swedes will permit us to complete deliveries on all existing contracts; 2. on those commodities on which the Swedes had given us concessions we can continue to export to Sweden at the same rate as in the record year 1946; and 3. with respect to other goods, we can sell to Sweden in total amount equal to the dollar exchange remaining in Sweden after the above sales have been deducted.

In other words, for the time being, the maximum value of the goods we ship to Sweden is the dollar value of Swedish exports to the United States plus whatever dollars Sweden takes in through her trade with other nations—such as Denmark, Norway, Great Britain and others.

Industry To Be Safeguarded

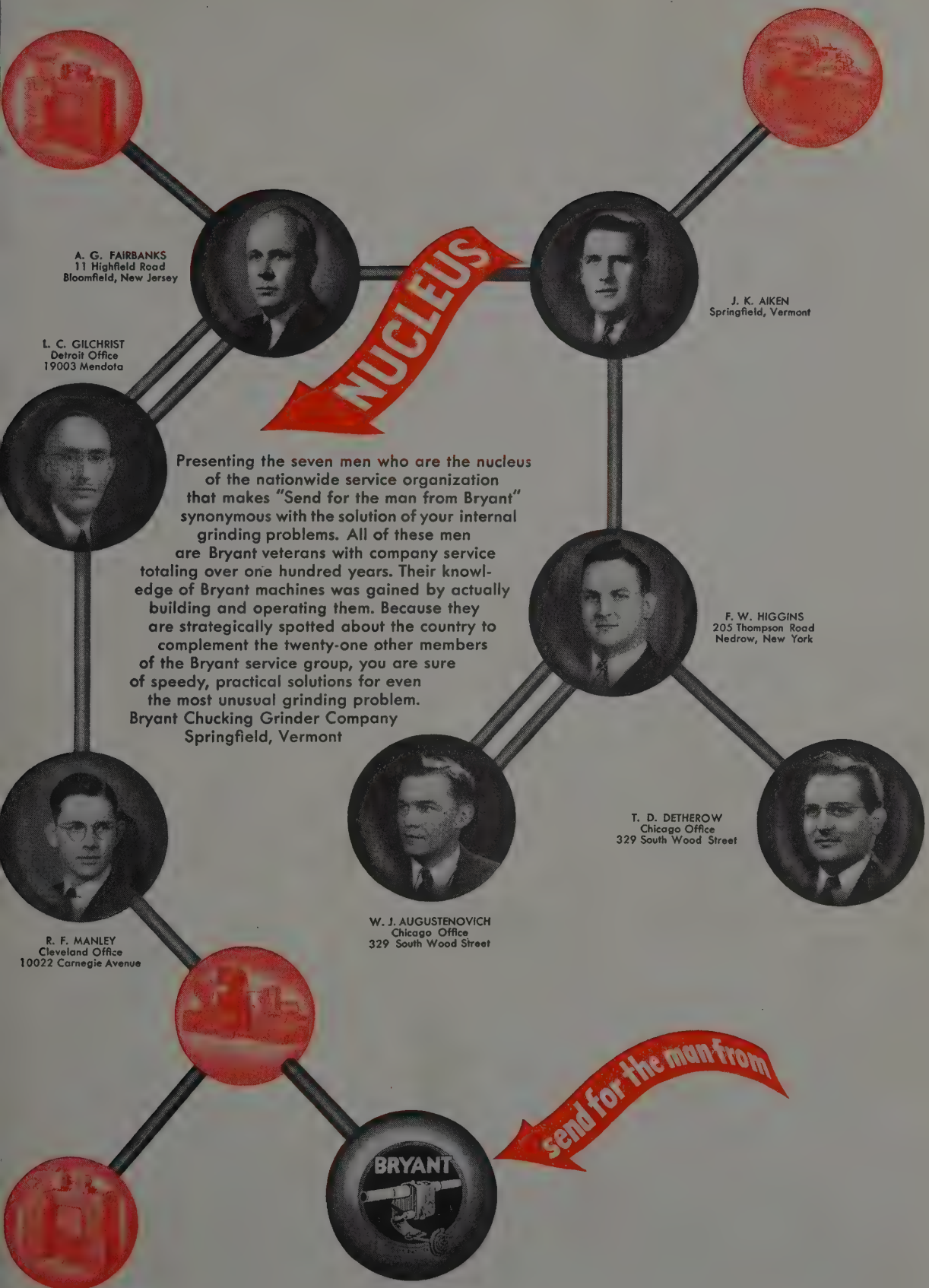
The United States Tariff Commission has amended its rules of practice and procedure to provide for future investigations under the President's Executive Order No. 9832 which directs that all future trade agreements contain a "safeguard" clause for protection of American industry. This provides that if, as a result of unforeseen developments, and of the concessions granted by the United States on any article, such article is being imported in quantities and under conditions that threaten domestic producers, the United States may withdraw the concession or modify it. Under the order, the Tariff Commission is to investigate such cases and report its findings to the President who will consider the situation.

In filing an application for an investigation, the interested party must supply "such information as will convince the commission that there is good and sufficient reason for ordering an investigation." Such information includes the number of workers in the affected domestic industry, dollar sales value of the domestic product, comparability of the domestic and the competing foreign product, geographic portions of the United States reflecting the competition between the foreign and domestic product, effect of the foreign competition on the domestic price, etc.

Group Sees Its Task Changed

When the Employment Act of 1946 was enacted last year it was criticized by liberals in Congress and the government for its watered-down version of the original Full Employment Bill. However, most of those who studied the act seriously believed it would produce beneficial results. For in the President's Council of Economic Advisers and the Joint Committee on the Economic Report, the Congress for the first time set up groups charged with the job of examining the nation's economy as a whole and, therefore, supposedly better able to prescribe policies for keeping it healthy.

So far the idea has not worked out very well, possibly because business has been very good ever since the act was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approved in February of 1946. Spokesmen for the council and for the joint committee who have studied the objectives feel more strongly than ever that the idea is sound but that it will not be until the development of some sort of a business recession that the intended reliance will be placed on the two groups.

This is because these two groups handle many economic factors that are the exclusive business of other groups. For instance, taxation is the business of the Treasury Department and the House Ways and Means Committee. Labor is the business of the Labor Department and the two congressional labor committees. The older groups, naturally, are better intrenched, and wield more authority. For example, not the Council of Economic Advisers but the Federal Reserve System Board of Governors is given credit for the President's recent veto of the income tax measure on the ground that it was of an inflationary character.

Divergent Views Cause Weakness

The basic weakness of both the council and the joint committee, however, seems to be the fact that there is no measure of agreement in this country as to what combination of conditions is necessary to produce and maintain full employment and full production. A tax man thinks the answer is to be found in tax policies. A social scientist thinks the answer is best found in a good security system. An exporter thinks the need is for the sale of more of our goods abroad. Recently the joint committee sent to a selected list of the country's highly regarded economists a questionnaire aimed at uncovering a broad program to insure maintenance of a high rate of employment; it received scarcely any valuable replies while many of the replies were utterly useless. One eminent economist, for instance, said the way to maintain full employment was to "simplify the income tax law so that people can understand it."

As a result of its experiences to date, the joint committee has come to the conclusion that perhaps its biggest task is to develop a body of concepts as to the long-run factors that make for prosperity —and gain public acceptance of them.

"The average man thinks of one thing at a time," a spokesman remarked a few days ago. "Usually he is taken with one of the popular slogans of the day which run their course and then fade away. For instance the old battlecry of 16 to 1 now is only a memory. The average man also is inclined to feel that when a certain economic controversy is settled, it is settled for an indefinite period. In the recent discussion about the need for reducing prices, why did not somebody think of reducing tariffs to provide competition to bring about lower prices on scarce goods? If we can get the public thinking about factors and combinations of factors that are good for long-run business prosperity we will be a lot closer to the fulfillment of the full employment goal than we now are."

Businessmen Are Appointed

A number of leading businessmen and industrialists have been named to President Truman's committee to determine what portions of our national resources can be shipped abroad for rehabilitation purposes without harming or wrecking our national economy. This committee is one of three appointed by the President as a result of warning from former President Herbert Hoover that we are "overexporting" our resources.

The other two are government committees. One, headed by Secretary of the Interior J. A. Krug, will make an over-all study of the nation's financial, industrial and natural resources. The other, headed by Dr. Edwin G. Nourse, chairman of the President's Council of Economic Advisors, will study the effect of our foreign aid on the national economy.

The committee of businessmen is headed by W. Averill Harriman, secretary of commerce, and consists of:

Hiland Batcheller, president, Allegheny Ludlum Steel Corp; Robert Earle Buchanan, dean, Graduate College, Iowa State College; W. Randolph Burgess, vice chairman, National City Bank of New York; Paul G. Hoffman, president, Studebaker Corp.; Calvin B. Hoover, dean, Graduate School, Duke University; Robert Kenig, president, Ayrshire Collieries Co.; James B. Carey, secretary-treasurer of the CIO; John L. Collyer, president, B. F. Goodrich Co.; Granville Conway, president, Cosmopolitan Shipping Co. Inc.; Melville F. Coolbaugh, former president of the Colorado School of Mines.

Chester C. Davis, president of the Federal Reserve Bank, St. Louis; R. R. Deupree, president of the Procter & Gamble Co.; Robert M. LaFollette Jr., former United States Senator from Wisconsin; Edward S. Mason, dean of the School of Public Administration, Harvard University; George Meany, secretary-treasurer of the AFL; Harold G. Moulton, president of the Brookings Institution; William I. Myers, dean, College of Agriculture, Cornell University; Robert Gordon Sproul, president, University of California; Owen D. Young, honorary chairman of the board of directors, General Electric Co.

Licensing Procedure Changed

Tin plate waste and tin plate circles, strips, cobbles and scrollshear butts have been removed by the Office of International Trade from the Consolidated License Procedure and have been placed under Individual License Procedure.

Iron and steel pipe fittings, over 150 pounds pressure, have been removed from the Positive List and placed on general license for exportation to all Group K destinations.

Businessman Credited for Idea

When Rep. Melvin C. Snyder (Rep., W. Va.) recently introduced H. R. 503 for establishment of a Department of Peace, and a Secretary of Peace with cabinet rank, he gave the credit for the idea to a businessman—R. M. Davis, president, Davis-Wilson Coal Co., Morgantown, W. Va.

Back in 1942 Mr. Davis suggested to President Roosevelt that, while the war still was being fought, an organization should be set up to win the ensuing peace. In view of the rapidly deteriorating international situation, Mr. Davis has been working up support for his idea and on June 18 the House Expenditures Committee heard arguments in its favor. It was disclosed that the idea has the hearty endorsement of State Department officials.

"The idea," explained Mr. Davis, "is to work as hard, during time of peace, for the cause of peace, as we work, in time of war, to fight the war." The Snyder bill calls for activities that will promote harmony between the United States and foreign countries and that, in particular, will create strong economic ties to insure the maintenance of peace and friendship.

Nonferrous Research

Nonferrous metallurgical research of the Bureau of Mines is reviewed briefly in a new publication entitled Report of Investigations 4064. Prepared by R. S. Dean, former assistant director of the bureau, and Bernard Silkes, former technical assistant, it includes a brief resume and bibliography on ore dressing, natural gas reduction of zinc, Scotch hearth smelting of lead, production of electrolytic antimony, recovery of nickel from nickel-chromium-iron ore, production of aluminum and magnesium and their alloys, ductile titanium, electrolytic cobalt, chromium, and manganese and their alloys, recovery of vanadium, and production of ductile zirconium. Copies may be had free by writing the Bureau of Mines, Washington 25, D. C.

Another free report, Information Circular 7401, by McHenry Mosier, describes desirable results obtained by using diamond drills in the preparation of blast holes at a large eastern magnetite development.

Greater Use of Standardization Promotes Production Economies

Better products at lower cost made possible through use of standardized purchasing, engineering and manufacturing procedures, National Industrial Conference Board's survey of 93 companies reveals

INDUSTRIAL standardization as a means for turning out a quality product at the lowest price compatible with satisfactory performance looms large in management's battle against high production costs. Shift from a sellers' to a buyers' market is further stimulating demand for higher quality products at lower prices. A survey recently completed by the National Industrial Conference Board shows the practical aspects of standardization and the operation of standards experts within companies using this approach to lower costs.

The survey, covering 93 companies, reveals that industrial standards can promote general usage of the best methods, materials, processes and products. Concentration of productive effort on a simplified line of standard products "permits management to realize the economies of repetitive mass production," the board declares. Additional benefits such as better and quicker servicing of customers and smaller inventory requirements from manufacturer to retailer are mentioned also as resulting from standardization.

Performance Standards Recommended

Dangers of too hasty standardization are emphasized in the survey which suggests wider application of simple performance standards "be encouraged as a substitute for detailed and rigid specifications." The automotive industry, which standardizes parts but not the final product, is cited as an illustration of the "wise use of standards."

Of the companies covered by the survey, about one-third reported they have formal standards departments. Most of those without special departments, however, reported they are participating in standardization within their companies and through industry-wide and national standardization organizations. Individual company standardization programs, the survey finds, are concerned primarily with technical standards such as dimensional characteristics, performance ratings and materials specifications.

Standards departments function in the following ways, the survey reports: 1. Develop procedures for investigating, preparing, approving, and distributing standards; 2. maintain constant surveillance over current practices in the company (a) to revise existing standards in light of new developments, (b) to check unjustified departures from standards, and (c) to avoid underexpansion of the product line; 3. represent the company in standardizing activities of the industry, trade associations, technical societies and national standards organizations; 4. keep the company informed on new standards or proposed standards of other companies and standards groups; 5. co-ordinate and reconcile divergent views of different departments on existing and proposed standards; 6. publicize the benefits of standardization to design, manufacturing and sales executives. At the same time, unsound standardization should be discouraged; and 7. act on requests of others for new standards or revisions of old ones.

Within the companies covered by the survey, different methods of operation of their standards groups were found. Generally, appointment of separate committees for individual projects, under sponsorship of the standards experts, is made. Some companies, however, work by means of consultation and conference, the standards group organizing the procedure. Regardless of what method is used, it was agreed by the reporting firms that printed standards, bound into a standards manual, form the heart of the standards program. Generally included in this manual are reports covering (a) procurement: Standard purchase specifications for materials, supplies, equipment and parts; (b) engineering: General engineering standards, standard design and drafting practice and standard testing methods; and (c) manufacturing: Standard component parts and parts numbers, tool standards, standard manufacturing processes and methods, standard finishes, standard fits and tolerances, standard safety practices and finished product specifications.

Practices of 15 individual companies with regard to standardization are described in detail and constitute the major portion of the board's report.

ISO SECRETARY NAMED

Henry St. Leger has been named general secretary of the newly formed International Organization for Standardization, Howard Coonley, president of ISO and chairman, executive committee, American Standards Association, has reported from Zurich, Switzerland.

Mr. St. Leger, an American, leaves his post as director of the Paris branch, Office of the United States Chief Counsel, to assume the position. He had taken a major part in organizing the war crimes trials at Nurnberg, Germany.

During the meeting of the international standards group, Canada, Chile and Hungary were admitted to membership, bringing the number of member nations to 23. Invitations to join have been issued to Argentina and Uruguay.

A committee, representing International Civil Aviation Organization, International Labour Organization, International Federation for Documentation, International Dairy Federation and the United Nations Educational, Social and Cultural Organization, was appointed at the meeting to promote co-operation on standardization matters.

Export Bank Aids U. S. Business in Foreign Trade

Now that it is safely reincorporated by an act of Congress signed by the President on June 9, the Export-Import Bank of Washington has lost no time in taking a number of actions to prove it is living up to its mandate to assist private business interested in foreign trade.

To finance the sale of tires and tubes to Finland, the bank has extended credits to the following suppliers: Firestone International $500,000, Fisk Tire Export $200,000, United States Rubber Export $500,000, B. F. Goodrich $133,333.

To General Motors Overseas has been alloted a credit for trucks to go to Finland. To S. & S. Construction Co. of Venezuela has gone a $600,000 credit to cover construction equipment.

For financing exports to Turkey, credits have been arranged as follows: $2,515,500 to Vulcan Iron Works, Wilkes Barre, Pa., 26 steam locomotives for Turkish State Railways; $354,000 to Westinghouse Electric International for power plants for lignite mines; $615,000 to International General Electric Co., steam turbo-generators and other equipment, and a hydroelectric plant; $200,000, Foster-Wheeler Corp., steam boiler and other equipment; $31,000, Eimco Corp., rocker shovels and other equipment for coal mines; $864,000, Western Machinery Co. for equipment for new chrome and copper concentration plants.

Crucible Steel Expands Spring-Making Plant

Million-dollar modernization project at Spring Works, Pittsburgh, is first portion to be completed in $30 million program designed to effect further integration of operations and to increase diversification of forms of finished steels for sale

A MILLION-DOLLAR expansion program at the Spring Works, Pittsburgh, of Crucible Steel Co. of America is helping speed the flow of heavy springs needed to cushion railroad rolling stock and heavy machinery.

Of the various projects of plant modernization and improvement for which the company is spending $30 million, the Spring Works project was the first to be completed. Output now is at the rate of 1500 tons monthly and is expected to be increased substantially as continuous straight-line production is more fully utilized.

Products of the Spring Works include large elliptical springs, some of them with more than 20 plates of steel, that are tested at weights of tens of thousands of pounds, and many types of coil springs. Size of springs produced at this plant ranges from 700 lb down to specialty items of 40 lb.

The company's $30 million program is aimed at effecting further integration of

Springs to cushion railroad rolling stock are shifted, upper left, to freight cars for delivery from the Spring Works, Pittsburgh, of Crucible Steel Co. of America to railroads and rail equipment makers. But before shipment a 14-leaf spring for the wheel truck of a locomotive tender is tested under 37,500 lb. pressure, lower left

From a variety of sizes of steel plates an elliptical spring for railroad rolling stock is built by pyramiding the leaves into matched assemblies, photo at immediate right. Afterwards, the pyramid is banded together, upper photo at far right

operations and making an increased proportion of its output available for sale in more diversified forms of finished steel. The company's steel ingot capacity is now greater than finished steel capacity, a situation which will be reversed upon completion of the expansion program.

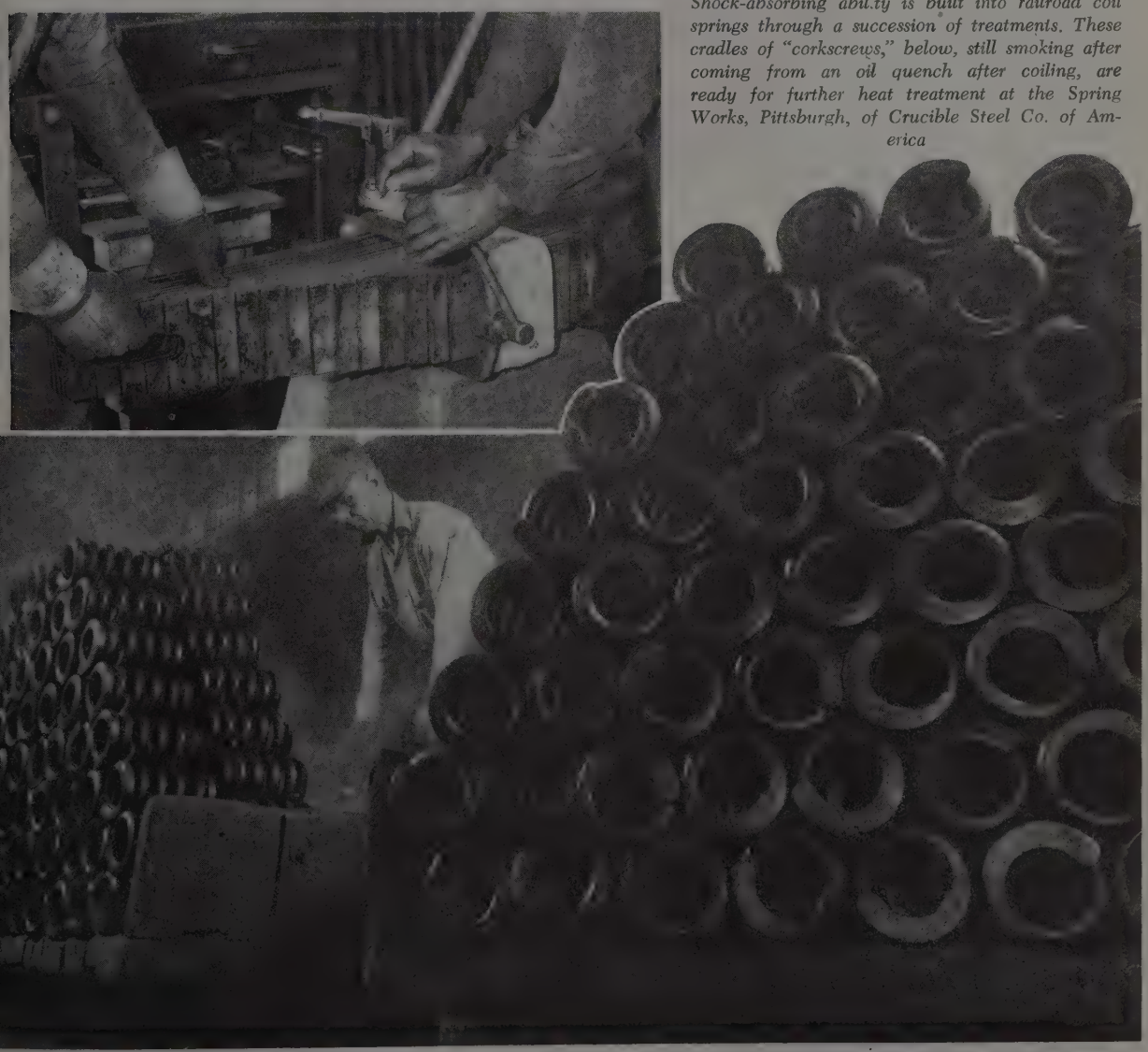
In addition to the million-dollar project at the Spring Works, the program includes expenditure of $3 million at the Park Works, Pittsburgh, more than $20.8 million at the Midland, Pa., plant, $1.6 million at the Spaulding & Jennings operations at Jersey City, N. J., and $3.3 million at the Halcomb Works and the Sanderson Works at Syracuse, N. Y.

At the Midland Works, a new six-stand, 24-in. billet and bar mill is scheduled to be in operation early in August. Its rated capacity will be 30,000 tons monthly. The company's new three-stand, four-high cold-reduction mill, and one-stand, four-high reversing hot mill, both 48 in., will not be in operation at Midland until 1948 because of delays in obtaining electrical and other necessary equipment. Installation of the old La Belle Works facilities in new quarters at Midland is expected to be completed this summer. The company hopes to be in production of disks by August and plow shares this fall. Construction of 21 new by-product coke ovens and rebuilding of existing ovens have been completed at Midland and will enable the company to produce all of its coke requirements from its own high volatile coal. In addition, the company is expanding its conditioning facilities, installing new soaking pits, ingot stripping facilities, and sintering plant and waste heat boilers.

Modernization at the Park Works includes installation of a 14-in. bar mill, a new specialty mill for rolling shapes and flats, and transfer to the Park Works of a 9-in. bar mill from the Atha Works at Harrison, N. J. In addition, new buildings are being constructed for processing, finishing, and warehousing, and some remodeling is being done for metallurgical laboratories and offices.

Production facilities for Halcomb and Sanderson steels for tools and other special purposes are being consolidated in one plant at Syracuse. New equipment will include electric furnaces having aggregate rated capacity of 170 net tons a day, raw material and scrap handling equipment, mold stripping and conditioning equipment, ingot heating and storage facilities. Completion of this installation is not expected until next year.

At Harrison, N. J., a plant built during the war is being made ready to house the Spaulding & Jennings Works. Finished steel output at the new location is expected to be increased substantially through modernization and relocation of existing facilities.



Shock-absorbing ability is built into railroad coil springs through a succession of treatments. These cradles of "corkscrews," below, still smoking after coming from an oil quench after coiling, are ready for further heat treatment at the Spring Works, Pittsburgh, of Crucible Steel Co. of America

Bumpers and similar parts that require good cold-forming quality in steel are stronger and more economical to produce when made of N-A-X HIGH-TENSILE.

N-A-X HIGH-TENSILE's resistance to deformation (denting) is 60% greater than the denting-resistant quality in carbon steel. Its inherently fine grain and higher hardness provide a better surface texture for plating.

If you have parts requiring a combination of high strength, good formability and better surface texture, it will pay you to investigate N-A-X HIGH-TENSILE steel.

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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Retirement plan written into wage contract of Ford and United Automobile Workers. Pay increase of 7 cents an hour granted, plus additional 5 cents for maintenance workers, coremakers and jobbing molders. Costs company $200 million yearly

DETROIT

FIRST retirement or pension plan for hourly rated employees in the automotive industry has been written into the new Ford Motor Co. labor contract and while full details of its operation have yet to be announced it is understood the amount to be contributed by the company toward pensions is the equivalent of 3½ cents an hour, or the same amount which other auto builders are paying out for six yearly holidays for employees. The Ford contract provides for a straight 7 cents an hour wage increase, bringing average hourly pay to about 3 cents an hour more than that of major competitors. An additional 5 cents an hour has been given to maintenance employees, coremakers and jobbing molders.

Agreement on the contract was reached after eight weeks of intensive bargaining, is retroactive to May 31 when the old contract expired and will run for a minimum of two years. It can be reopened for negotiation on economic matters solely, and then only once during the two years.

Major Provisions Listed

Major provisions of the retirement plan as announced by Richard T. Leonard, head of the Ford local, include benefits equivalent to 1 per cent of an employee's pay times the number of years of service with the company, such benefits being provided for past as well as future service. Leonard estimates benefits for past service will cost the company more than $200 million, while future benefits will involve about $15 million annually. He adds that the company's contribution to the fund will amount to approximately 17½ per cent of the payroll, or around 14 cents an hour.

The example is cited of a workman earning $200 a month who would in 30 years contribute about $1800 of his own earnings and receive $100 a month at retirement, of which $55 would have been purchased by the company's contributions. If the same workman were to purchase an individual annuity, it would pay him $55 a month for life and cost approximately $9000.

Other provisions of the plan include death benefits, total and permanent disability payments, full vested rights in individual contributions and partial rights in company payments after a specified number of years, and an optional retirement age probably between 55 and 65 years. It is estimated 95 per cent of hourly rated Ford employees will be eligible to participate in the plan at once.

The Ford-UAW-CIO local has been thumping for a pension plan for a long time and union leaders have made intensive studies of various types of plans. They hailed Ford's agreement to the plan as a major victory in their campaign for old-age security. As a matter of fact, the entire CIO has been batty over "security" plans since its organization. The belief that the average working man is unable to plan for his own security in old age and will die a pauper unless the union takes care of him has developed into a major crusade among union leaders, although there is considerable question just how strongly the rank and file feels about the question.

A good many persons feel the American working man has sufficient intelligence to work out his own security and does not need the mothering influence of union-sponsored plans. And beyond this, there is even some question over the wisdom of all industrial, professional and educational institutions which retire their personnel at 60 or 65 and cut short the careers of individuals who could and would stay on the job for many more years. For example, Dr. Roger I. Lee, past president of the American Medical Association, stated in an address recently, "Death comes at retirement . . . These people receiving old age and other retirement pensions, much to the surprise of all, do not stay happy even when they receive their retirement money . . . The most intelligent of the pensioners rebel when they are retired, and lead a miserable existence that cuts short their life span."

Perhaps consideration should be given to revising retirement plans which force an individual to abandon his job just because he has reached a certain age, and make such retirement optional to the person involved. There are many capable and hard-working engineers and executives well up in their seventies who are still making major contributions to the nation's industrial progress and who would find their forced retirement most unsettling since it would leave them with nothing but idle time on their hands, time in which to do nothing more than contemplate the fact they are old men.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	399,717	84,109
March	441,793	140,738
April	449,388	248,108
May	390,629*	247,620
June		216,637
July		331,000
August		359,111
September		342,969
October		410,510
November		380,664
December		380,908
12 ms.		3,268,456

* Preliminary.

Estimates for week ended:		
June 14	97,943	50,206
June 21	102,545	54,475
June 28	104,855	66,913
July 5	70,000	45,155

Foremen's Strike Continues

Strike of Ford foremen, now well into its second month, is continuing and in view of passage of the Taft-Hartley labor bill their cause appears lost. The head of the foremen's union, however, proposes to fight the issue out in the courts, which could be a long procedure and meanwhile his striking members are becoming more and more hard-pressed economically. The foremen have called for help from the UAW-CIO in the form of boycotts on Ford products and refusal to work on jobs without supervision, but the UAW has done little more than give lip service to the strike. This is not to say that Ford production is running smoothly in the absence of foremen. It is not, and in many cases has been kept going only by emergency measures on the part of superintendents.

Wage Settlements Analyzed

A recent check of 169 companies in the parts industry, made by the Automotive & Aviations Parts Manufacturers Inc., to develop information on wage settlements, showed 84 settlements concluded with unions, 19 wage increases given where no union was involved, 14 companies with no settlement and no negotiations started, 50 still in process of

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REAR ENGINE: R. H. Armstrong explains the rear end engine mounted on the chassis of a stripped model of the Tucker car. Each of the six cylinders has an individual exhaust pipe leading from engine to rear of car and emerging from under the rear bumper. In foreground is the new fuel injector. NEA photo

negotiations, and two giving interim increases while still negotiating.

Of the 84 settlements reached, 39 were for less than the 14-15 cents an hour "package" type of increase, while 45 involved approximately this amount. Some 50 companies give paid holidays as such, ranging from two a year to eight, with most agreeing on six. Many agreements stipulate that employees work the last scheduled work-day preceding and the next scheduled work-day following a holiday to be eligible to receive holiday pay. A number specify no extra pay when the holiday falls on Saturday or Sunday, or when an employee is laid off for lack of work. Some provide an employee will not be paid for a holiday falling within his vacation period. One agreement adds $67 to the former vacation bonus in lieu of paid holidays, but the employee must qualify for the vacation bonus by having at least one year's seniority and working at least 1300 hours. In another, the employee earns credits toward paid holidays—one hour credit for each 40 hours worked, up to a maximum of 48 hours' credit per year.

Anibal Retires

Recognized as the dean of automotive engineers, Ben H. Anibal, who directed the engineering development of the Pontiac since its inception, has retired after 34 years with General Motors. He started with Oldsmobile in 1909, then transferred to Cadillac and assisted in the design of the first V-8 automobile engine ever built in this country and the first car to be electrically lighted and started. During the first World War he played an important role in the development of the Liberty engine and served GM in Washington. In 1919 he became chief engineer of Cadillac, and resigned in 1921 to become chief engineer of Peerless.

When the Pontiac was conceived in 1925, he returned to take over its engineering development and has been there ever since, becoming administrative assistant to the general manager earlier this year and turning over the engineering reins to George Delaney. Anibal is credited with over 200 specific engineering improvements on motor cars.

Steel Shortage Halts Assemblies

Assembly of bodies and final assembly of passenger cars by the Plymouth, Dodge, De Soto and Chrysler divisions of Chrysler Corp. halted last week because of shortages of sheet steel in these plants and those of Briggs Mfg. Co. Operations were scheduled to be resumed this week in Dodge, De Soto and Chrysler plants and next week at Plymouth. As many manufacturing operations as possible were kept going where sheet steel was not involved, but the curtailment affected close to 30,000. It was the second time in the past several months Chrysler divisions were forced to suspend assemblies because of exhaustion of steel inventories.

Apparently General Motors divisions have geared their assembly pace to approximately the rate of steel intake, since there have been no major shutdowns in their plants. Nash plants in Wisconsin have closed for two weeks under a previously made arrangement for vacations and inventory-taking, which should permit a build-up of steel stocks.

Factory Sales Drop

Official figures on passenger car factory sales for May, compiled by the Automobile Manufacturers Association show a total of 284,403, as against 314,372 for April, a drop of 9.5 per cent, and also ascribed to steel shortage. Truck and coach sales also declined from 108,410 in April to 98,782 in May. Total sales of motor vehicles recorded for the first five months of the year were 1,950,493, or over 2½ times the number sold in the same period of 1946.

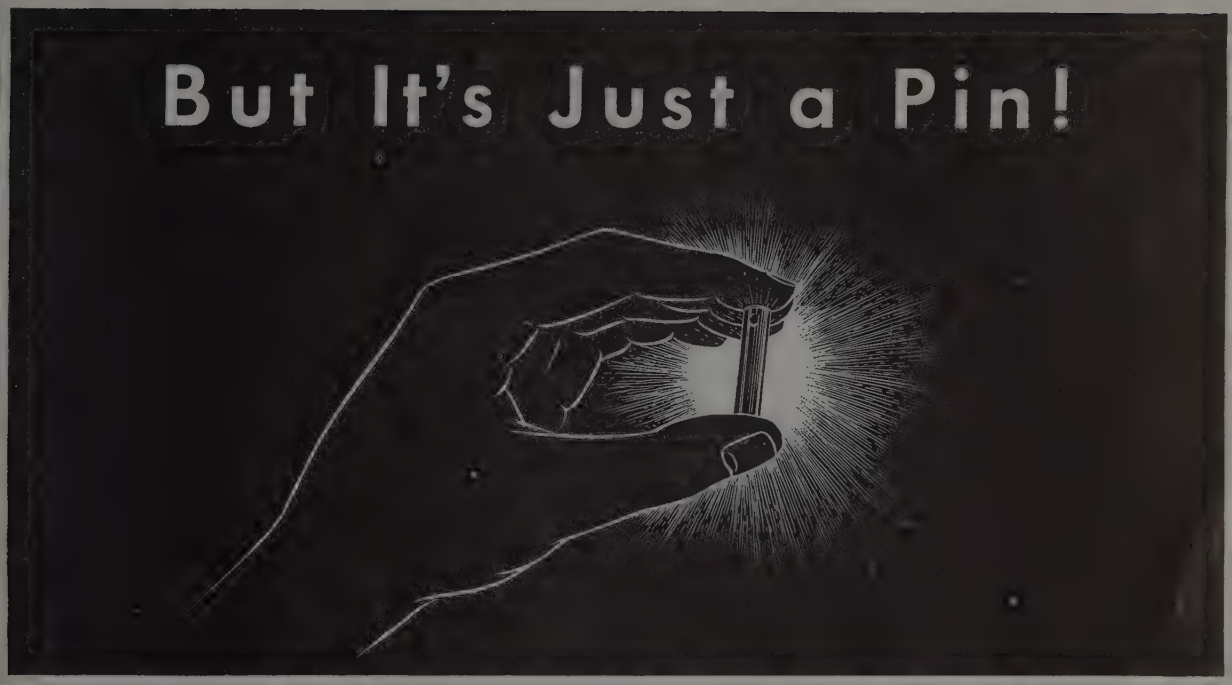
Official Figures Lacking

Official government figures on automobile production in the past have always been compiled by the Department of Commerce and during the war the work was taken over by the War Production Board and later the Office of Temporary Controls. With the liquidation of the latter office, there is no source in Washington for the figures. No plans have been announced for resumption of the statistical service by the Department of Commerce, but it is certainly something which should be done and would not involve any large outlay of funds. While the A.M.A. figures are reliable they would have better distribution and might carry more authority if they were to come from a government agency as in the past.

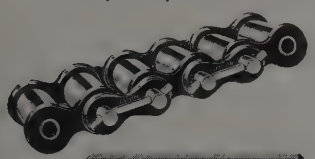
Anniversary Olds Planned

Next year will be the 50th anniversary of the Oldsmobile Division of General Motors, and it is a foregone conclusion there will be a Golden Anniversary Olds to mark the occasion. The model will embody more than the usual number of innovations, if advance tips are correct. A completely restyled body and a new engine are distinct possibilities, some comment being to the effect the present 150-horsepower Cadillac engine might be switched to Olds, and a new smaller V-8 with higher compression ratio and 180-horsepower rating developed for Cadillac. Olds has long been recognized as a sort of style leader in the General Motors family, as well as the "proving ground" for mechanical innovations like the Hydra-Matic transmission.

But It's Just a Pin!



This short length of UNION roller chain is made up of the 28 separate parts shown below.



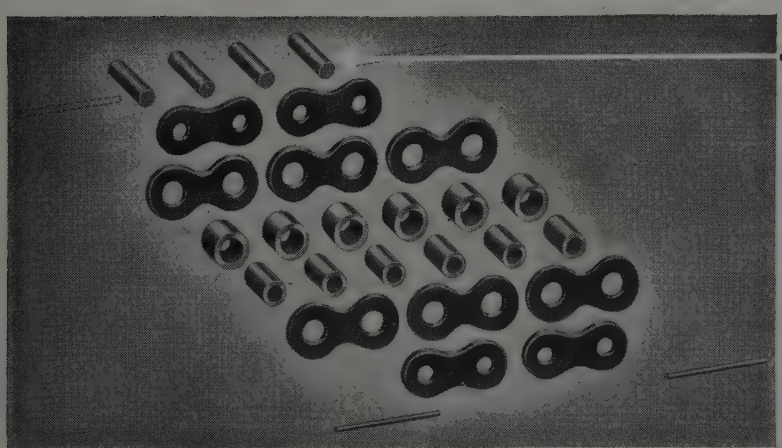
UNION CHAINS

Yes, it's a pin—just a small pin. But it requires 11 distinct and precise operations to make it. For this is a pin for a link of UNION roller chain, and together with the bushings and the rollers it accepts and withstands all the wear that a roller chain is subjected to.

If you will study the "exploded" drawing below you will see that there are 4 of these pins in the short length of UNION roller chain shown at the left. You will also see that there are a total of 28 separate parts in this same length of chain. To make them all, exactly 290 operations are required. And every step from receipt of material to finished product is under the careful supervisory control of an inspection department responsible to the engineering division.

As specialists in the manufacture of sprocket chains, sprockets and attachments (we make nothing else!), we point with some pride to the high standards of skill and precision maintained by our engineers and craftsmen at UNION CHAIN. We are not yet able to meet the overwhelming demand for UNION chain, but we assure our customers and friends that we are making every effort to do so, consistent always with the character of our product and the complicated processes of its manufacture.

The Union Chain and Manufacturing Company • Sandusky, Ohio



THESE 11 OPERATIONS TO MAKE THIS STEEL CHAIN PIN:

1. straighten stock material
2. cut off to length
3. chamfer ends
4. carburize
5. drill for cotter pin hole
6. re-heat and quench
7. re-heat to refine core structure
8. draw to relieve internal strains
9. rough grind
10. finish grind
11. anneal end for riveting

Allis-Chalmers Organizes New Turbine Section

Turbo-development department formed to study applications for ships, locomotives and stationary plants

FORMATION of a turbo-development department in the engineering development division of Allis-Chalmers Mfg. Co. has been announced by W. C. Johnson, executive vice president for the company's general machinery division.

R. C. Allen, former head of the Allis-Chalmers steam turbine department, has been named manager and chief engineer of the new section. W. A. Yost, formerly assistant manager, succeeds Mr. Allen as manager of the steam turbine department.

The newly formed organization will particularly pursue turbo-power developments for ships, locomotives and stationary plants, based on past experience with industrial and military turbine units. One project currently under way is the 3750 hp, coal-burning locomotive gas turbine being constructed for the Locomotive Development Committee of Bituminous Coal Research Inc. Being probed for the future are possible applications of the gas turbine for oil-fired locomotive use, for driving generators in utility service, for driving blast furnace blowers, large centrifugal pumps or pipeline gas compressors and for marine auxiliary generating sets.

Mr. Allen joined the Allis-Chalmers steam turbine department in 1936, serving subsequently as chief engineer, then assistant manager, and manager and chief engineer since 1943. For four years he was a member of the National Advisory Committee for Aeronautics special committee on jet propulsion. He holds over 60 patents and is the author of numerous papers on steam and gas power machinery.

Mr. Yost, assistant manager since 1945, came to Allis-Chalmers from Elliott Co. in 1943.

A BESSEMER LEARNS STEELMAKING: The English-born great nephew of Sir Henry Bessemer, inventor of the bessemer steelmaking process, is studying steelmaking this summer in the Homestead plant of Carnegie-Illinois Steel Corp., Homestead, Pa. He is seen here on the right as his attention is being directed to one of the open hearth furnaces by Michael Getsy, steel pourer

Standard Tube Co. Building $875,000 Plant Near Detroit

Standard Tube Co., Detroit, manufacturer of welded tubing and fabricated parts, has begun construction of an $875,000 plant in Redford Township near Detroit, S. L. Willis, vice president, has announced.

Located on a 49-acre tract, the one-story plant will have 142,000 sq ft of floor area and will be laid out with two cross bays and three parallel bays, all served by ten and 15 ton overhead cranes. It is expected that the facility will be available for occupancy by next Nov. 15.

Founded 19 years ago, the company is now located in part of Ford's Highland Park plant.

Philco Gives Up Industrial Battery Division in Trenton

Philco Corp., Philadelphia, has sold its industrial battery division in Trenton, N. J., to National Battery Co., Leavenworth, Kans., which has consolidated the operations with its subsidiary, Gould Storage Battery Corp.

Philco retains the manufacturing facilities at Trenton which will be devoted to production of radios, radio phonographs, television sets, refrigerators and home freezers.

Twenty New Factories Set Up in Los Angeles in May

During May 20 new factories were established in Los Angeles county with a total investment of $18,818,000 and 35 existing plants were expanded, calling for an additional investment of $3,875,000, Los Angeles Chamber of Commerce reports.

For the year to June 1, 91 new factories were established with a total investment of $33,662,000 and 163 existing plants were expanded, calling for an additional investment of $18,438,500. Total investment for the first five months in the 254 new and expanded units was $52,100,500.

Carborundum Plans To Have New Chicago Headquarters

Carborundum Co., Niagara Falls, N. Y., announces that the Philco Corp. assembly plant in Chicago which it recently purchased for $200,000 will become its Chicago sales office and warehouse after additions and alterations have been completed. The office will be under the direction of C. E. Hawke, domestic sales manager, W. C. McCargo, regional sales manager, with Gordon C. Watson in charge as district sales manager.

The present building has a floor space of 35,000 sq ft. Construction work, soon to be started on an additional story which will house the sales offices and provide additional warehousing facilities, will increase the total floor space to 61,000 sq ft.

Domestic Electric Truck Bookings in May Total 245

Domestic bookings for electric industrial trucks and tractors during the month of May, 1947, totaled 245 units, according to figures recently released by the Electric Industrial Truck Association, Chicago.

The net value of chassis only booked during May totaled $1,146,647, compared with $1,018,967 in April, 1947.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Air Speed Tool Co., Los Angeles, manufacturer of air-powered tools, has moved into its newly constructed plant at 1500 W. Slauson Ave.

—o—

American Radiator & Standard Sanitary Corp., Pittsburgh, manufacturer of heating and plumbing products, has increased expansion plans at its two Buffalo plants from an original estimate of $500,000 to $2,500,000. Plans include a new warehouse.

—o—

Besser Mfg. Co., Alpena, Mich., has purchased a plant in Van Nuys, Calif., and has begun manufacture of automatic machinery for making brick, tile and blocks. The West Coast firm, a wholly owned subsidiary, will be known as Besser Mfg. Co. of California. Carl Olson is plant manager.

—o—

Kinkead Industries Inc., Chicago, will soon begin West Coast manufacturing operations in Los Angeles, making metal and plastic moldings. Mark Cowdrey will be California manager.

—o—

Solar Aircraft Co., San Diego, Calif., has recently received orders for over 2300 stainless steel exhaust manifolds and jet engine parts valued at more than $700,000.

—o—

Metal Working Lubricants Inc., Cleveland, newly formed, will engage in the manufacture and sale of industrial oils, lubricants and heat treating supplies.

—o—

Symons Bros. Screen Co., North Hollywood, Calif., has moved to a 15,000 sq ft plant for increased production of vibrating screens for rock plants and mines.

—o—

Motor Division, Westinghouse Electric Corp., Pittsburgh, has announced that $5 million has been added to the division's $20 million expansion plans for its plant at Buffalo. This is part of a $132 million, company improvement plan.

—o—

Metal Clad Baking Equipment Co., Los Angeles, has purchased a 1¼-acre tract in Torrance, Calif., and will construct a 12,000 sq ft building there for manufacture of baking ovens and metal clad insulation for heavy industrial use.

—o—

Railroad Siding Construction Co., Pittsburgh, has been newly formed to build sidings and maintain and rehabilitate old ones. C. H. Arnold Jr. is one of the principals in the firm.

—o—

Cressell Stainless Steel Co., Chicago, has been formed by Edward G. Cressell as a sales and service engineering company to handle stainless steel in all forms. Mr. Cressell was formerly Chicago district manager of Geary Stainless Steel Co., Baltimore.

—o—

Bowers Hoist & Winch Co., Lynwood, Calif., has completed a plant addition for increased production of industrial and truck winches and hoisting equipment.

—o—

Household Utilities Division, Westinghouse Electric Corp., Pittsburgh, announces that it will soon introduce a new automatic washing machine regulated by the setting of a single dial which controls both water temperature and washing time.

—o—

Herbrand Corp., Fremont, O., tool manufacturer, has appointed Lynn & Brooks, with offices in Los Angeles, San Francisco and Portland, Oreg., as its sales representative in California, Arizona, Oregon, Washington an western Idaho.

—o—

Salsbury Motors Inc., Pomona, Calif., subsidiary of Northrop Aircraft Inc., has appointed Wheel Industries Inc., San Francisco, as factory representative for Salsbury's industrial trucks and other products. Wheel Industries is a sales subsidiary of Budd Co., Philadelphia.

—o—

Kodye Inc., Cincinnati, manufacturer of office supplies, has moved to 27 W. Court St.

—o—

Koppers Co. Inc., Pittsburgh, has announced that two of its subsidiaries will become integral parts of Koppers Co. Pennsylvania Coal Products Co., Petrolia, Pa., will be known as Pennsylvania Coal Products Department of Koppers' Chemical Division. Wailes Dove-Hermiston Corp., Westfield, N. J., will operate as a department of Koppers' Tar Products Division.

—o—

Electric Industrial Truck Association has consolidated and moved its Pittsburgh and Chicago offices to 2928 41st Ave., Long Island City, N. Y.

—o—

Carboloy Co. Inc., Detroit, manufacturer of tools, abrasives, welding equipment and general industrial supplies, has appointed Sioux Machinery & Supply Co., Sioux City, Iowa, as a distributor in South Dakota, northwestern Iowa and northeastern Nebraska.

—o—

Carborundum Co., Niagara Falls, N. Y., recently broke ground for the first major building at Niagara Falls of its expansion program which eventually will involve an expenditure of more than $50 million. This first unit is a $1,250,000 maintenance building.

—o—

Federated Metals Division, New York, American Smelting & Refining Co., has been licensed to manufacture and sell Everdur, a patented silicon bronze alloy originally produced and sold by American Brass Co., Waterbury, Conn.

—o—

American Rolling Mill Co., Middletown, O., held a ground-breaking ceremony recently, signalling the beginning of construction of two electric furnaces, first part of a $3 million construction project.

—o—

Bethlehem Steel Corp., Bethlehem, Pa., has purchased all coal holdings in Marion county, Pa., formerly owned by Jamison Coal & Coke Co., Greensburg.

—o—

Zatko Metal Products Co., Cleveland, manufacturer of tools and dies, has moved into its $100,000 plant.

—o—

Charles L. Jarvis Co., Middletown, Conn., manufacturer of power tools, has purchased the Dowding Division of Henry L. Hanson Co., North Attleboro, Mass., maker of taps and dies. Dowding products will continue to be made.

—o—

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., manufacturer of temperature and pressure indicating, recording and controlling instruments, has moved its Chicago sales office to 1120 Merchandise Mart.

—o—

Ohio Rubber Co., Willoughby, O., manufacturer of mechanical, molded and extruded rubber products, has announced the opening of a plant in Long Beach, Calif., to be operated by Ohio Rubber Co. of California, a subsidiary.

—o—

Service Tool & Engineering Co., manufacturer of aircraft accessories and special tools, has announced that its new location is at 1811 S. 66th St., West Allis, Wis.

—o—

Philco Corp., Philadelphia, has developed a receiver to provide overseas airlines with semiautomatic navigational aid for bringing aircraft to their destinations from distances up to 1500 miles offshore.

—o—

Glidden Co., Cleveland, manufacturer of paint, industrial finishes and other products, held a meeting recently of 50 of its major executives to discuss further integration of the company's operations.

—o—

Vital Products Mfg. Co., Cleveland, is manufacturing a new, light weight calking gun for sale through retail stores. Marketing is being handled by Gibson Homans Co., Cleveland, maker of calking compounds and paint products.

Industrial Pace Checked And Outlook Is Clouded

THE RAPID PACE of industrial production has been checked by the coal mining crisis, the Fourth of July holiday and mass vacations of industries, and the outlook for recovery is clouded by the mining stoppage's disruptive effects on industry's fuel supply.

After being on the upgrade the first three weeks of June and in the third week of that month nearly equaling the postwar high mark, industrial production fell back in the week ended June 28 as the mining stoppage spread. Consequently, STEEL's industrial production index for the week ended June 28 registered a preliminary 159 per cent of the 1936-1939 average. In the preceding week, it had been 163, just one point below the postwar peak.

One of the first effects of the mine work stoppage was a drop in coal loadings of railroad cars, and another that will become progressively worse until the normal flow of fuel is resumed is steelmaking. Disruption to the latter will be felt for months hence because of the heavy backlog of orders for steel.

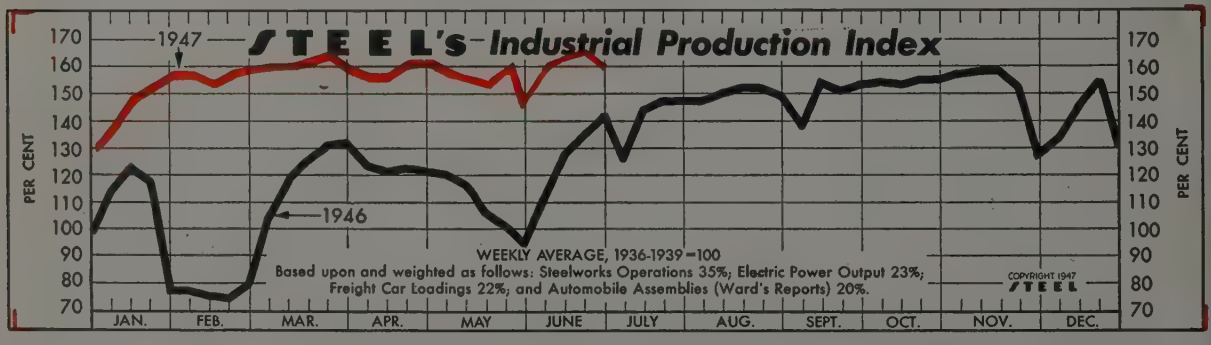
AUTOS—Among the industries that most keenly would feel any diminution of steel supplies would be the automobile industry, currently the biggest user of steel. With a big backlog of orders on hand, the auto manufacturers had hoped to exceed the 5 million car and truck mark this year, but that goal is appearing increasingly difficult to attain. Before the current impediments to production, the auto industry had pushed production up to an estimated 104,853 passenger cars, trucks and busses in the week ended June 28.

EMPLOYMENT—Although the number of employees in nonagricultural employment in May had risen to 41,983,000 from 41,767,000 in April, the number in manufacturing establishments declined to 15,260,000 in May, compared with 15,418,000 in April. The decline in manufacturing employment was the result mainly of production curtailments, said the Federal Reserve Board, which reported its indexes of durable and nondurable goods manufacturing down slightly in May.

BUSINESS SUMMARY—However, a strong upturn in mining activity in May helped hold the Federal Reserve Board's preliminary index of industrial production that month at the April level of 186 per cent of the 1935-1939 average.

PRICES—Up slightly in the week ended June 21, the Bureau of Labor Statistics wholesale price index registered 147.8 per cent of the 1926 average of 100. The gain from the preceding week's 147.6 per cent resulted from an increase in agricultural prices. Nonagricultural prices remained unchanged on the average.

INDUSTRIAL BUILDING—No recession is indicated in the market for industrial engineering and building services, the H. K. Ferguson Co., Cleveland, reports. However, definite trend toward building cost stabilization has been noted, the company's cost curves reflecting no rise over a two-month period.



The Index (see chart above): Latest Week (preliminary) 159 | Previous Week 163 | Month Ago 150 | Year Ago 142

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	96.5	96.5	95.5	88.0
Electric Power Distributed (million kilowatt hours)	4,650‡	4,676	4,429	4,133
Bituminous Coal Production (daily av.—1000 tons)	2,150	2,146	2,137	1,979
Petroleum Production (daily av.—1000 bbl.)	5,115‡	5,114	5,024	4,957
Construction Volume (ENR—Unit $1,000,000)	$143.5	$94.5	$72.2	$128.6
Automobile and Truck Output (Ward's—number units)	104,855	102,545	79,315	66,913

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons. ‡ Preliminary.

TRADE

Freight Carloadings (unit—1000 cars)	787†	901	830	880
Business Failures (Dun & Bradstreet, number)	70†	70	72	14
Money in Circulation (in millions of dollars)‡	$28,183	$28,195	$28,211	$28,135
Department Store Sales (change from like wk. a yr. ago)‡	+3%	+6%	+13%	+35%

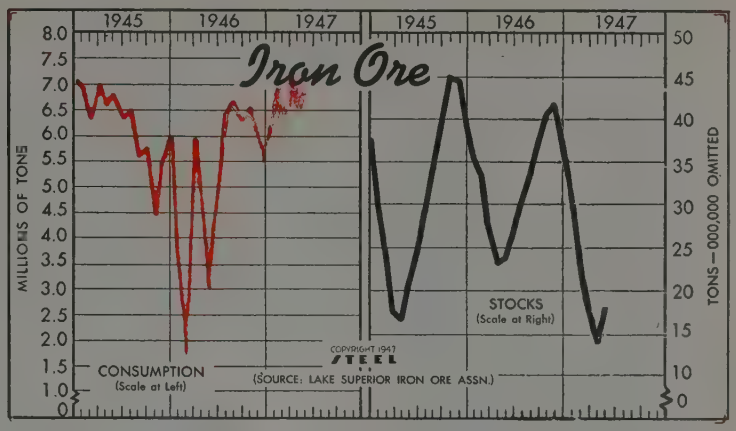
† Preliminary. ‡ Federal Reserve Board.

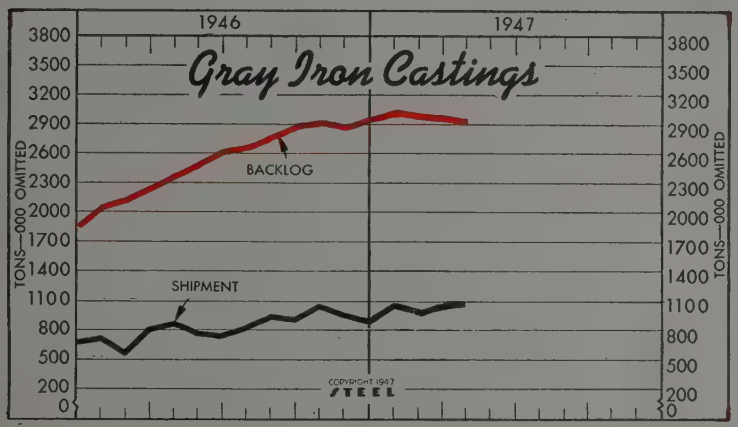
Iron Ore

(Lake Superior Iron Ore Assn.)

Gross tons—000 omitted

	Consumption		Stocks at Lake Erie docks and furnaces	
	1947	1946	1947	1946
Jan.	7,024	3,719	30,514	35,342
Feb.	6,264	1,748	24,317	33,647
Mar.	6,979	6,021	17,411	27,601
Apr.	6,579	4,769	13,555	23,079
May	6,885	2,990	17,618	23,905
June		4,995		26,265
July		6,460		30,439
Aug.		6,738		34,067
Sept.		6,380		37,573
Oct.		6,625		40,435
Nov.		6,131		41,919
Dec.		5,516		37,465
Total		62,093		





Gray Iron Castings

(U. S. Bureau of Census)

Tons—000 omitted

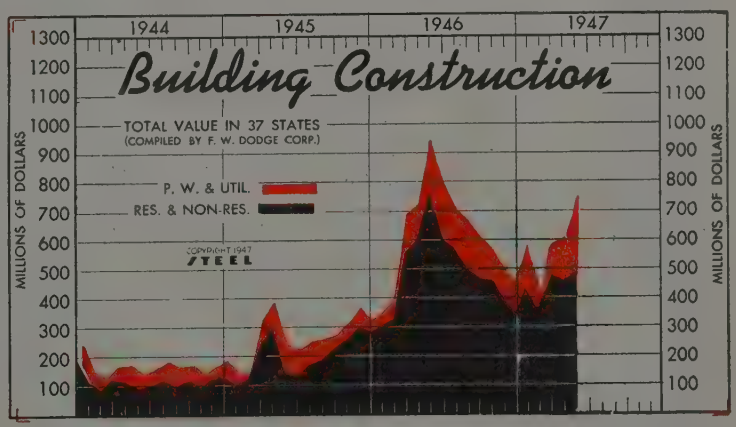
	Shipments		Backlogs*	
	1947	1946	1947	1946
Jan.	1,078	727	3,021	2,096
Feb.	1,010	572	2,987	2,182
Mar.	1,090	820	2,979	2,285
Apr.	1,097	886	2,908	2,430
May		783		2,531
June		757		2,640
July		840		2,708
Aug.		973		2,814
Sept.		937		2,897
Oct.		1,078		2,953
Nov.		987		2,940
Dec.		909		2,980
Mo. Ave.		856		2,621

* Unfilled orders for sale to the trade.

Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities		Residential and Non-residential	
	1947	1947	1946	1947	1946
Jan.	571.6	113.9	50.2	457.7	307.3
Feb.	442.2	90.5	64.7	351.6	322.7
Mar.	596.8	122.0	143.6	474.8	554.0
Apr.	602.3	161.4	128.1	441.0	606.8
May	742.8	252.9	197.9	490.0	754.6
June			202.5		605.5
July			153.1		564.9
Aug.			184.4		495.6
Sept.			156.4		463.5
Oct.			112.8		460.4
Nov.			121.8		382.0
Dec.			115.9		341.4
Total			1,631.4		5,858.7



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,624	$13,135	$11,629	$12,435
Federal Gross Debt (billions)	$257.7	$257.4	$258.3	$269.2
Bond Volume, NYSE (millions)	$19.5	$18.4	$13.4	$18.3
Stocks Sales, NYSE (thousands)	4,336	4,711	2,998	5,108
Loans and Investments (billions)†	$55.1	$54.7	$54.8	$62.5
United States Gov't. Obligations Held (millions)†	$34,596	$34,171	$34,535	$44,324

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$69.82	$69.82	$69.82	$64.45
All Commodities†	147.8	147.6	146.9	112.4
Industrial Raw Materials†	161.5	161.2	160.3	126.0
Manufactured Products†	142.9	142.9	142.1	107.7

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

ADRIAN O. HOLMBERG

T. R. COFFEY

JOHN DIEBOLD

Adrian O. Holmberg has been elected vice president for manufacturing, National Radiator Co., Johnstown, Pa., succeeding **E. W. Longacre.** Mr. Holmberg formerly had been manager of several manufacturing divisions of the A. O. Smith Corp., Milwaukee. Mr. Longacre, who has been vice president-manufacturing for the past 20 years, is on an extended leave of absence, and will act in a consultive capacity on his return to the company.

—o—

C. Foster Brown has been named general office manager, Ceco Steel Products Corp., Chicago.

—o—

R. D. Duthie has been appointed assistant to the vice president of the Westinghouse Electric Corp., Pittsburgh. He succeeds **A. J. Bronold,** who has been transferred to the company's B. F. Sturtevant Division in Boston as general agency and contractor manager.

—o—

T. A. Engstrom has been elected a vice president of Continental Motors Corp., Muskegon, Mich., and manager of the Muskegon Division of the company. He has been connected with the company since 1925.

—o—

J. C. Frantz, formerly associated with Bayless-Kerr Co., Cleveland, has been appointed director of sales research for Apex Electrical Mfg. Co., Cleveland.

—o—

J. C. Hatten has been appointed manager of the Southwest sales region for the farm equipment section of Graham-Paige Motors Corp., Detroit. He will have headquarters in Dallas, Tex.

—o—

George D. Pence has been elected president of Wilson Foundry & Machine Co., Pontiac, Mich. He succeeds **Wallace O. Leonard. J. G. Paule** has been named general manager of the foundry. Mr. Pence has been director of special activities at Willys-Overland Motors Inc., Toledo, O.

—o—

T. R. Coffey has been appointed manager of sales of the Detroit office of Globe Steel Tube Co., Milwaukee, to be effective July 14. He has served as manager of sales of the company's Wisconsin office for the past four years, and prior to that time had been associated with the company in various capacities in the general sales department.

—o—

Brig. Gen. Hugh C. Minton, production manager of Koppers Co. Inc., Pittsburgh, has been appointed a vice president of the company.

—o—

Walter J. Daily has been named manager of the Vacuum Cleaner Division, Lewyt Corp., New York. He has been associated with the Bendix Home Appliances Inc., South Bend, Ind.

—o—

Lloyd W. Hackley has been named superintendent of production planning of American Steel & Wire Co., U. S. Steel subsidiary. He succeeds **F. J. Boes,** who has retired. **James E. Rogerson** has been made assistant superintendent to succeed Mr. Hackley.

—o—

Walker G. White and **Harry W. Tenney** have been appointed managers of the Elevator Division of the Westinghouse Electric Corp., Pittsburgh. Mr. White will be in charge of contracting operations, and Mr. Tenney of manufacturing operations. Both men have been connected with the corporation for more than 25 years.

—o—

Raymond L. Gillispie has retired from Bethlehem Steel Co., Bethlehem, Pa., after being connected 37 years with the manufacture and sale of railway products. He has been a consultant in the sales department of the Rail and Track Accessories Division.

—o—

John Diebold has been appointed a representative in northern Ohio for the Precision Welder & Machine Co., Cincinnati. He will have offices in Cleveland. He recently had been chief production engineer for the Rudolph Wurlitzer Co., Cleveland, and had been connected with the Truck & Coach Division of General Motors Corp., Detroit, in charge of the welding engineering department.

—o—

Forest H. Humphreys has been appointed manager, Safety and Claims Division, American Car & Foundry Co., New York. He succeeds **Karl N. Searles,** who recently retired.

—o—

Harold L. Hoefman has been elected vice president in charge of manufacturing, Link-Belt Co., Chicago. He has been general manager of the company's Pershing Road plant, Chicago, and is succeeded by **David E. Davidson.**

—o—

Louis F. Demmler, director of research and merchandising, Ketchum, MacLeod & Grove Inc., Pittsburgh, has resigned to become president of Demmler Bros. Co., Pittsburgh. He is succeeded by **William R. Parker,** formerly assistant manager of market research, Koppers Co. Inc., Pittsburgh.

—o—

Juan X. Aguirre has been elected secretary of the Ecuadorean-American Association Inc., New York. He is assistant manager of the Foreign Division of the Colonial Trust Co., New York. **Robert D. Merrill,** International Telephone & Telegraph Corp., has been elected vice president, and **George H.**

the ZINC stays on!
This is deep-drawing zinc-coated sheet steel. The special zinc coating on ARMCO ZINCGRIP takes as severe a draw as the base metal. And it doesn't flake, doesn't peel. The full-weight coating s-t-r-e-t-c-h-e-s and flows in the dies — gives better overall rust protection. For ZINCGRIP products requiring immediate painting, Bonderized ARMCO PAINTGRIP can be supplied. The American Rolling Mill Company, 2291 Curtis Street, Middletown, Ohio.
SPECIAL-PURPOSE SHEET STEELS
ZINCGRIP
ARMCO
STEEL
THE AMERICAN ROLLING MILL COMPANY

White, Standard Oil Co. of New Jersey, treasurer of the association.

—o—

Leonard R. Scribner has been appointed chief engineer of the Tantalum Sales Division of Fansteel Metallurgical Corp., North Chicago, Ill. He succeeds **Frederick L. Hunter,** who has resigned to enter into private consulting practice, but will continue to devote a substantial portion of his time to Fansteel Corp.

—o—

E. C. Smith, chief metallurgist, Republic Steel Corp., Cleveland, has been given a degree of doctor of science by Case Institute of Technology, Cleveland.

—o—

Cecil U. Zorn, contracting engineer, Ambridge, Pa., plant of American Bridge Co., a U. S. Steel Corp. subsidiary, has been transferred to the Elmira Hts. plant of the company, to succeed **J. R. Thompson,** who has been appointed contracting manager of the Boston district office.

—o—

Lt. Col. S. C. Guillan has been appointed secretary of the British Institute of Metals, and editor of its publications.

—o—

John C. Sanford, traffic manager at Birmingham for the Chicago Bridge & Iron Co., Chicago, has been elected president of the Birmingham Traffic & Transportation Club, succeeding the late **Arthur J. Ribe.**

—o—

Raymond B. Tripp, executive vice president, Ohio Forge & Machine Corp., Cleveland, has been elected president of the Drop Forging Association. Other officers and directors elected are: Vice president, **Ralph A. Mitchell,** Pittsburgh Forgings Co., Coraopolis, Pa. Directors, **Raoul A. Charpentier,** Storms Drop Forging Co., Springfield, Mass.; **Harry K Cross,** Rhode Island Tool Co., Providence, R. I.; **George C. Miller,** Lakeview Forge Co., Erie, Pa.; **Joseph F. Rice,** Drop Dies & Forgings Co., Cleveland; **Barney C. Cox,** Melling Forging Co., Lansing, Mich.; **W. Clair Shaffer,** Michigan Forging Co., Detroit; **James A. Cook,** Standard Forgings Corp., Chicago; and **Louis M. Fehrenbach,** Indianapolis Drop Forging Co., Indianapolis. **R. M. Seabury,** who has had a continuous term of 12 years as secretary-treasurer, has been re-elected, and **Holloway Kilborn** has been re-elected assistant secretary-treasurer.

—o—

Col. Grant Layng, manager, Builders Division, Bendix Home Appliances Inc., South Bend, Ind., has been presented with the silver star medal by the War Department "for conspicuous gallantry in action while commanding the 137th infantry regiment."

GRISWOLD A. PRICE

—o—

Carnegie-Illinois Steel Corp., subsidiary of U. S. Steel Corp., New York, has announced the combining of their sales units in the Chicago district. The enlarged organization will be directed by **Griswold A. Price,** manager of the Chicago district sales office. Reporting to Mr. Price will be **Edward W. Backes,** appointed railroad industries sales manager, **John H. Morava,** appointed manufacturing industries sales manager, and **George O. With,** appointed construction industries sales manager.

—o—

Chase Brass & Copper Co., Waterbury, Conn., has announced three personnel changes affecting their warehouse system: **Leland S. Hanson,** manager of the company's New York branch, has been promoted to sales manager, Eastern Division, and eventually will make his headquarters in Waterbury. **Herbert H. Bartlett,** manager of the Chicago branch, succeeds Mr. Hanson as New York manager. **G. Townsend Underhill,** sales manager of the New York branch, has been promoted to manager of the Chicago branch.

JOHN J. DAVIS JR.

Has joined the staff of the Railroad Division, Inland Steel Co., Chicago. Noted in STEEL, June 30 issue, p. 63

—o—

Cleveland Norcross, formerly executive secretary of the Office of Scientific Research and Development, has been appointed assistant director of the American Institute of Physics, New York.

—o—

John L. McCaffrey, president of the International Harvester Co., Chicago, has been elected a director of the Santa Fe Railway.

—o—

Joseph J. Mayer has been elected vice president and a director of the Lumen Bearing Co., Buffalo. He succeeds the late **C. H. Bierbaum.** Mr. Mayer will continue to serve as general superintendent, a position he has held for the last 10 years.

—o—

Walter Carlson has been appointed assistant sales manager of the Truck Body & Hoist Division of the Heil Co., Milwaukee.

—o—

Col. Leslie S. Fletcher has been appointed technical director of Sam Tour & Co. Inc., and its affiliate, the American Standards Testing Bureau Inc., both of New York. He has recently been retired from the U. S. Army.

—o—

Election of four new officers of the Studebaker Corp., South Bend, Ind., has been announced, to fill vacancies resulting from the operation of a retirement program: **P. O. Peterson** has been elected vice president in charge of manufacturing to succeed **Ralph A. Vail,** retiring. **E. E. Richards** has been elected treasurer, and **Paul M. Clark,** secretary, succeeding **A. G. Rumpf,** retiring secretary-treasurer. **A. J. Porta** has been elected comptroller, succeeding **H. E. Dalton. J. F. Cotter,** general attorney, is retiring from that position but continues with the company as a director.

—o—

Carl C. Nelson, works manager in charge of factory production, and **James DeKiep,** chief engineer, Electric Machinery Mfg. Co., Minneapolis, have been named to the company's board of directors.

—o—

Edward P. Geary has been elected vice president and general sales manager of Atlas Steels Ltd., Welland, Canada. He will supervise all commercial activities including both the Domestic and the Export Sales Divisions.

—o—

George A. Custer has been elected vice president in charge of manufacturing, and **C. H. Rickenback** has been

"Round table" approach to Rolling Mill design

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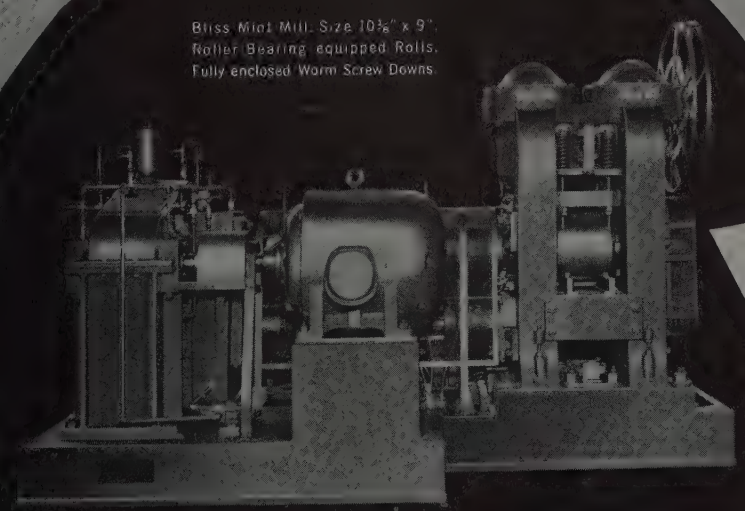

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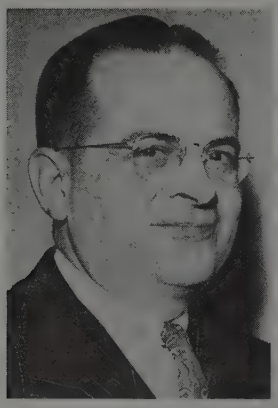
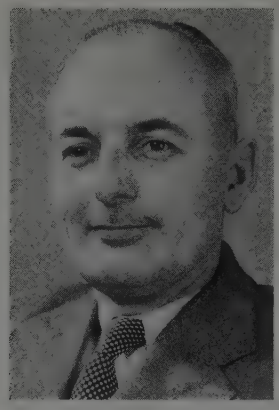


JOHN R. JOHNSTON

Appointed assistant general manager of sales, Carnegie-Illinois Steel Corp., Pittsburgh. Noted in STEEL, June 30 issue, p. 58

JOSEPH B. CARY

Elected executive vice president, Food Machinery Corp., San Jose, Calif. Noted in STEEL, June 30 issue, p. 62



T. O. ARMSTRONG

Appointed director, plant labor relations, Westinghouse Electric Corp., Pittsburgh. Noted in STEEL, June 23 issue, p. 96

named assistant secretary of the Peninsular Grinding Wheel Co., Detroit. Mr. Custer has been active in the grinding wheel business for 25 years, the last 10 of them with Peninsular. He has been factory superintendent for two years and chief engineer for eight years. Mr. Rickenback has been office and personnel manager for the company.

—o—

L. L. DeWolf has been appointed superintendent of marine erection by Babcock & Wilcox Co., New York. He has been assistant superintendent of marine erection since 1941 when he came to the New York office from the marine engineering department in Barberton, O. He succeeds **M. Nielsen,** who has been named production superintendent of the company's Barberton Works.

—o—

Roy E. Lane, Texas architect, has joined the staff of Bozell & Jacobs Advertising Agency in Dallas, Tex., as technical advisor to the agency's clients dealing in building, construction and manufacturing.

—o—

A. R. Collins has been appointed head of manufacturing and engineering of Division III, the South Wind heater plant at Indianapolis of the Stewart-Warner Corp., Chicago. Other appointments in the South Wind organization include that of **E. L. Sandberg,** chief accounting officer, to the additional post of assistant to Mr. Collins; **W. E. Judd,** as assistant sales manager.

—o—

B. C. Price has been appointed vice president in charge of manufacturing of the Swan-Finch Oil Corp., New York. He became associated with Swan-Finch in 1908, and during his 39 years with the company, he served as sales representative in Boston and Buffalo, as sales manager of the jobbing department, as a special representative in Washington during the war, as general manager of plants, and as a director of the company. **Walter W. Brey,** controller, has been appointed treasurer of the company.

—o—

C. L. Vanderbogart, vice president, Niagara Lithograph Co., Buffalo, has been re-elected president of the Point of Purchase Advertising Institute.

—o—

Harry Ginsberg has been elected chairman of National Container Corp., Long Island City, N. Y. **Marshall M. Bernstein** has been named secretary and **George J. Schneider** has been elected a director. The three positions were formerly held by the late **Abraham Herman.**

—o—

James A. O'Donnell has been appointed district representative of conduit products in the Great Lakes district for General Electric Co., Schenectady, N. Y.

—o—

W. R. Becker has been appointed product promotion manager for wiring device sales in the Wiring Device & Accessory Equipment Division of General Electric Co., Schenectady, N. Y.

—o—

Harry S. Gould has been named district manager for metropolitan New York for the Appliance Sales Division of Yale & Towne Mfg. Co., New York. He formerly had been connected with General Electric Co., Schenectady, N. Y., and with Westinghouse Electric Corp., Pittsburgh.

—o—

R. S. Hammond has been appointed general sales manager, Building Products Division, Johns-Manville Corp., New York, and a vice president of Johns-Manville Sales Corp., succeeding **L. C. Hart,** who has been appointed to the new office of vice president for relationships.

—o—

W. S. McAleer has been elected vice president of the McNally Pittsburg Mfg. Corp., Pittsburg, Kansas. He will maintain headquarters in Pittsburgh, Pa., as manager of the Eastern district of the company.

—o—

George A. Mohlman, president, Package Machinery Co. East Longmeadow, Mass., has been elected chairman of the committee on arrangements of the Packaging Machinery Manufacturers Institute, which will hold its 15th annual meeting on Oct. 6 and 7 in Springfield, Mass.

—o—

Three new members have been added to the sales staff of the Diamond Machine Tool Co., Los Angeles: **Edwin J. Ray,** Eastern Divisional manager; **Robert W. Vachon,** sales manager; and **Stephen Swiatek,** advertising and public relations.

—o—

W. E. Blowney has been named assistant division engineer in the Turbine-generator Engineering Division of General Electric Co., Schenectady, N. Y., with general administrative responsibilities. **P. H. Knowlton** has been named to the same post, with responsibility in thermodynamic and fluid research. **E. E. Parker** has been named section engineer of the steam turbine section; **H. D. Taylor,** section engineer in the generator section; and **Alan Howard,** section engineer in the gas turbine section.

—o—

James R. Weaver, works manager of the East Springfield, Mass., plant of Westinghouse Electric Corp., Pittsburgh, has been named a director of the Wico Electric Co., West Springfield, Mass.

Additional Metals Advisory Groups Set Up by Army and Navy Board

Four committees from industry prepare for their duties by organizing into subcommittees and working groups. Organizational meeting of recently announced Iron and Steel Industry Advisory Committee to be held early next fall

MEMBERSHIP of four more industry advisory committees in the field of metals has been announced by the Army and Navy Munitions Board. At their initial meetings, held in May, the duties of each committee were outlined and the members organized into subcommittees and working groups.

The organizational meeting of the Iron and Steel Industry Advisory Committee (STEEL, June 30, p. 41) is slated to be held early next fall.

The four new groups and their members are:

Nonferrous Industry Advisory Committee—O. W. Bilharz, Bilharz Mining Co., Baxter Springs, Kans.; J. M. Bowlby, president, Eagle-Picher Mining & Smelting Co., Cincinnati; G. H. Chambers, vice president, Foote Mineral Co. Inc., Philadelphia; Sidney Cohn, Sigmund Cohn & Co., New York; Robert E. Dwyer, executive president, Anaconda Copper Mining Co., New York; Benna Elkan, National Zinc Co., New York; Leo Halpern, assistant to president, Federated Metals Division, American Smelting & Refining Co., New York; Marshall L. Havey, executive vice president, New Jersey Zinc Co., New York; Carl A. Ilgenfritz, vice president in charge of purchases, U. S. Steel Corp., Pittsburgh; J. A. Martino, president, National Lead Co., New York; Charles Pack, vice president, Doehler-Jarvis Corp., New York; N. W. Rice, president, U. S. Smelting, Refining & Mining Co., Boston; Samuel H. Williston, vice president, Cordero Mining Co., San Francisco; Felix E. Wormser, St. Joseph Lead Co., New York; Howard I. Young, president, American Zinc, Lead & Smelting Co., St. Louis.

Aluminum and Magnesium Industry Advisory Committee—Irving T. Bennett, vice president, Revere Copper & Brass Inc., Baltimore; L. M. Brile, Fairmont Aluminum Co., Fairmont, W. Va.; Wiser Brown, vice president, American Magnesium Corp., Cleveland; P. A. Dulin Jr., president, Dulin Bauxite Co. Inc., Sweet Home, Ark.; O. L. Earl, Acme Aluminum Foundry Co. Inc., Chicago; J. G. G. Frost, Aluminum & Magnesium Inc., Sandusky, O.; Leo B. Grant, sales manager, Magnesium Division, Dow Chemical Co., Midland, Mich.; J. G. Landrigan, United Wire & Supply Corp., Providence, R. I.; G. W. Motherwell, vice president, Wyman-Gordon Products Corp., Worcester, Mass.; Charles Pack, vice president, Doehler-Jarvis Corp., New York; R. S. Reynolds Jr., Reynolds Metals Co., Richmond, Va.; D. A. Rhoades, vice president, Permanente Metals Corp., Washington; R. J. Roshirt, Bohn Aluminum & Magnesium Corp., Detroit; W. A. Singer, Apex Smelting Co., Chicago; I. W. Wilson, Aluminum Co. of America, Pittsburgh; George N. Wright, John Harsch Bronze & Foundry Co., Cleveland.

Ferro and Nonferrous Additive Alloys Committee—Quincy Bent, vice president, Bethlehem Steel Co., Bethlehem, Pa.; E. D. Bransome, Vanadium Corp. of America, New York; R. E. Dwyer, Anaconda Copper Mining Co., New York; C. R. Hook, president, American Rolling Mill Co., Middletown, O.; John Kreusi, Southern Ferro Alloys Co., Chattanooga, Tenn.; Andrew L. Leith, E. J. Lavino & Co., Plymouth Meeting, Pa.; Paul D. Merica, vice president, International Nickel Co. Inc., New York; W. J. Priestley, president, Electro Metallurgical Co., New York; Winthrop Sargent, president, Titanium Alloy Mfg. Co., New York; Charles H. Segerstrom Jr., Nevada-Massachusetts Co., Sonora, Calif.; Francis M. Sherwin, Brush Beryllium Co., Cleveland; James Thorpe, Climax Molybdenum Co., New York; E. M. Wanamaker, president, Electro Manganese Corp., Knoxville, Tenn.; J. W. Weitzenkorn, vice president, Ohio Ferro-Alloy Corp., Canton, O.

Copper and Copper Base Alloys Industry Advisory Committee—M. W. Acker, Olin Industries Inc., East Alton, Ill.; Alfred Bellis, John A. Roebling's Sons Co., Trenton, N. J.; K. C. Brownell, vice president, American Smelting & Refining Co., New York; W. J. Bullock, president, W. J. Bullock Inc., Birmingham; Cleveland E. Dodge, vice president, Phelps Dodge Refining Corp., New York; R. E. Dwyer, Anaconda Copper Mining Co., New York; B. J. Flaherty, Johnson Bronze Co., Newcastle, Pa.; W. M. Goss, Seeville Mfg. Co., Waterbury, Conn.; Leo Halpern, assistant to president, Federated Metals Division, American Smelting & Refining Co., New York; Benjamin Harris, president, Benjamin Harris & Co., Chicago Heights, Ill.; E. R. Lovell, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.; A. J. McNabb, Magna Copper Co., New York; Russell J. Parker, assistant to president, Kennecott Copper Corp., New York; H. W. Steinkraus, president, Bridgeport Brass Co., Bridgeport, Conn.; J. Vuillequez, vice president, U. S. Metals Refining Co., New York.

OBITUARIES . . .

George M. Walton, 60, president of Madison Foundry Co., Cleveland, died June 28. He joined the company when he was 16, was made secretary at 21, and gradually moved up to vice president. He assumed the presidency in 1942.

—o—

Thomas C. DeLavel-Crow, 61, chief engineer at the New Departure Division, Bristol, Conn., of General Motors Corp., died at his home in that city June 28.

—o—

William L. McGrath, 61, former general manager of the Eclipse plant of Bendix Aviation Corp., Detroit, died recently. He joined Eclipse in 1916, and when the firm was acquired by Bendix, he was made a vice president of the corporation.

—o—

Howard C. Padlock, 72, a civil engineer for 27 years with the Turner Construction Co., New York, died June 24.

—o—

Thomas J. O'Connell, 53, purchasing agent for the Hanna Furnace Corp., Buffalo, died recently.

—o—

John C. Kennedy, 59, vice president and works manager of the Kennedy Valve Mfg. Co., Elmira, N. Y., died recently.

—o—

Benjamin L. McCarthy, 51, assistant general superintendent, Wickwire Spencer Steel Division, at Buffalo, of the Colorado Fuel & Iron Corp., died recently. He had been associated with the Wickwire Spencer Division for 30 years.

—o—

Roy R. Zipprodt, research and consulting engineer, Committee on Reinforced Concrete Research, American Iron & Steel Institute, died at his home at Summit, N. J., June 20.

—o—

Thomas W. Flack, 47, vice president, Revere Copper & Brass Inc., Chicago, died June 25 in Evanston, Ill. He had been in charge of the company's Manufacturing Division.

—o—

Edwin T. Beardsall, 63, Chicago district manager of the Fellows Gear Shaper Co., Chicago, died June 25.

GAS CHEMISTRY

Its Role

Carbon restoration, precise control of carbon-bearing gases for heat treatments, dry cyaniding, bright annealing copper, rapid heating for forging are some significant developments reviewed by the author

UNTIL the early thirties the metal industries considered gas as a fuel and little more. True there was some attempt at controlling furnace atmospheres by adjustment of burners used for heating but the limitations of such control were readily appreciated.

Gradually there was a pronounced tendency toward separating the work from the heating gases in the furnace. The early use of furnace muffles permitted this improvement and the later development of radiant tube heating was responsible for the greatly increased popularity of gas fired equipment and the rapidly expanding use of special prepared gas atmospheres in the metals processing field.

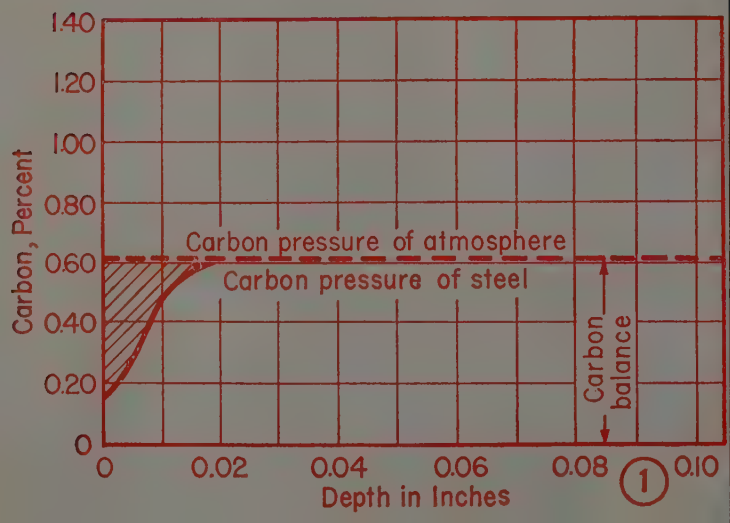
The applications for special gas atmospheres have been directed towards two broad objectives (1) prevention or minimization of changes in the surface of the metal during heat-treatment, and (2) purposeful changes in surface conditions along desired and controlled lines, as shown in table. The first of these is by no means new; in fact the use of atmospheres to prevent scaling or oxidation of the metal was used extensively for several years before the war.

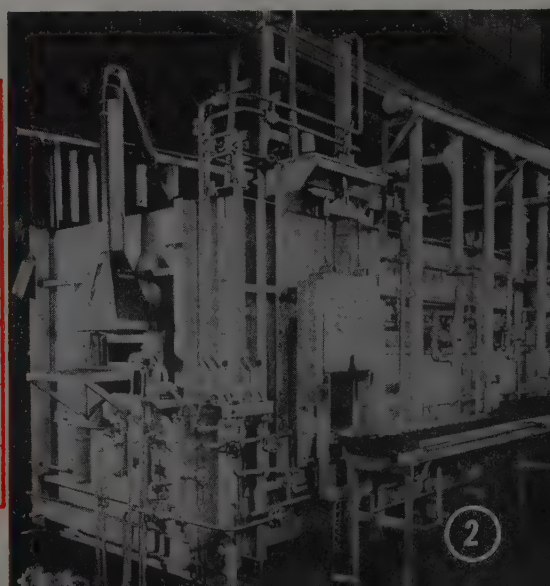
In the ferrous metals industries gas chemistry plays its most important roles. It is of utmost importance to present briefly some of the more noteworthy metallurgical advances which are dependent upon gas.

Of most significance is the use of gas atmospheres to restore the surface carbon in carbon depleted steel, Fig. 1. The process is applicable for both carbon and low alloy steel. It is useful when the carbon content of the steel surface has been reduced during precious heating for forming operations such as rolling, swaging, forging, etc. prior to completion of its finished form. Stock such as bars, plates and rods as initially received from the mill may have carbon depleted surfaces.

Following forming it is often necessary to machine away surfaces which are depleted in carbon content. The metallurgical objections to finished products having decarburized surfaces are too lengthy to describe in detail, but it suffices to state that physical properties of stressed steel parts are directly affected by the surface carbon content of the steel. If depleted carbon can be put back economically, costly machining or oversizing of cross sections is eliminated.

It is not sufficient to restore carbon in a haphazard fashion. Careful control must be exercised so that the carbon is replaced to almost exactly its original content or the process is useless. The science of gas chemistry makes available furnace equipment, gas generators and the knowledge necessary to accomplish carbon restoration or "skin recovery" as it is sometimes called, in a manner which will satisfy the most exacting specifications, Figs. 2 and 3. By way of example we might mention a practical application of carbon restoration to 0.35 per cent carbon steel bolts which are roll threaded and then heat treated for maximum physical properties. One does not have to be a metallurgist to appreciate the futility of hardening such a bolt if the threads remain soft and weak, Fig. 8. The solution to this problem was carbon restoration while the bolts were passing through a continuous belt furnace for heating prior to final quench hardening.





By O E CULLEN
Chief Metallurgist
Surface Combustion Corp
Toledo O

n Metallurgy

Fig. 1—Typical skin recovery curve showing balanced carbon relationship between atmosphere and core, and final surface carbon in metal

Fig. 2—Continuous controlled atmosphere pusher type furnace employed in carbon restoration process

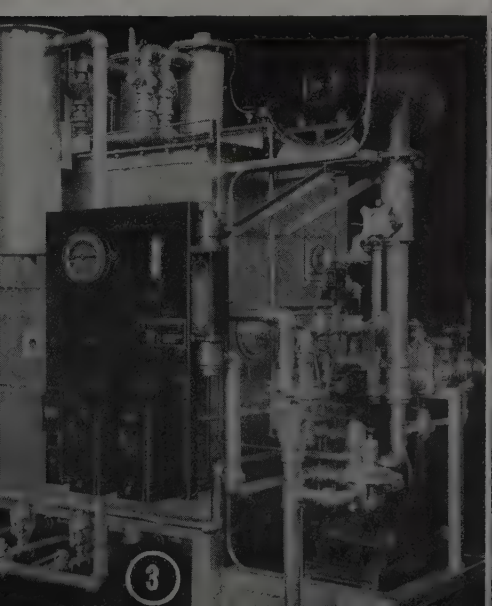
Fig. 3—Surface RX generator. RX gas is employed as carrier gas in carburizing and as atmosphere for carbon restoration and clean, controlled-carbon hardening

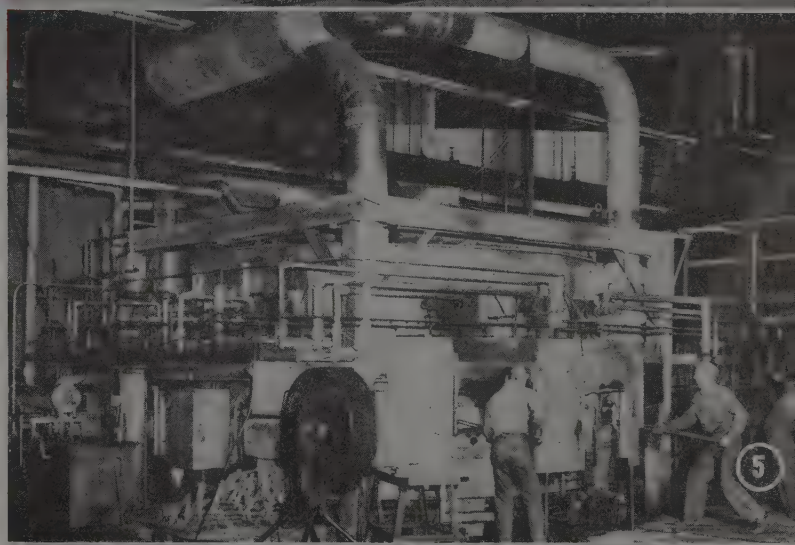
Fig. 4—Radiant tube carbottom furnace for controlled atmosphere annealing without scaling or decarburization

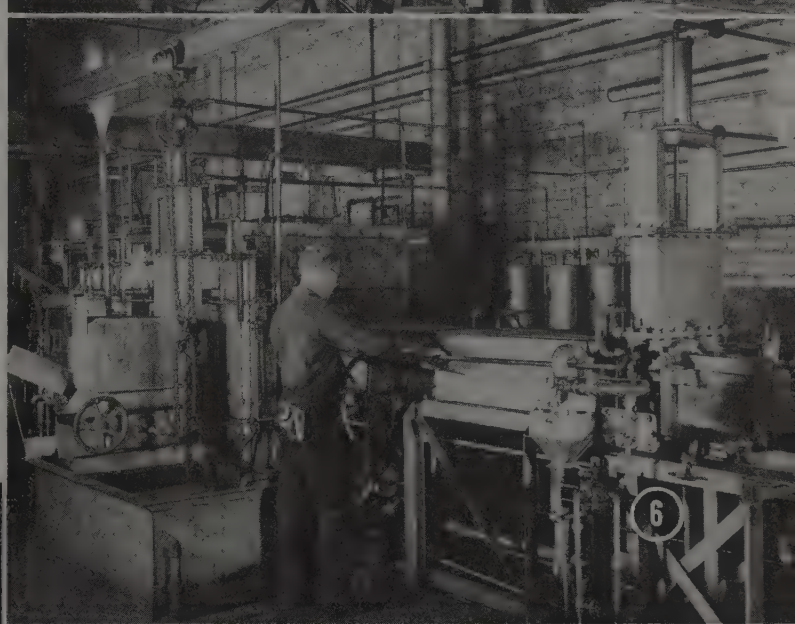
Fig. 5—Controlled atmosphere, rotary hearth furnace used for atmosphere heating for forging

Fig. 6—Dry cyaniding furnace used for slow cooling

Fig. 7—Direct-fired annealing cover for controlled atmosphere heating of nonferrous materials







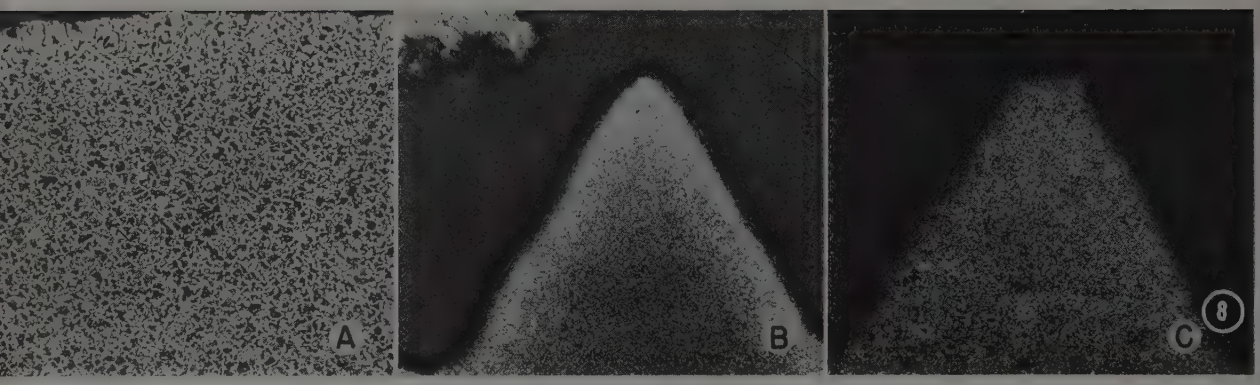


Fig. 8—Photomicrographs, X100, of SAE 1035 steel used in production of bolts. (A) Steel in "as received from mill" condition. Note decarburized edge. (B) Bolt after thread forming, followed by normal hardening. Again note soft edge. (C) Bolt of same stock after carbon restoration during heating for hardening in a balanced carbon atmosphere

While on the subject of carbon restoration it might be well to point out that the process is not limited to treatment of finished parts. How much more satisfactory it would be if the steel supplied by the mill were of uniform carbon content from center to surface. In the past, steel free from decarburization could be supplied if the customer insisted, but at premium prices because removal of decarburized portions was accomplished by grinding.

It will only be a matter of time before continued demand for better quality of unfinished steel will result in adoption of carbon restoration by steel manufacturers. At least one manufacturer is cognizant of this fact and is now turning out a limited supply of rod and bar stock which has been annealed in suitable atmospheres to restore original surface carbon content to the steel, Fig. 4. Such advancements are not long kept secret or confined to so limited a production scale.

Heating for forming usually requires high temperatures and recarburization occurs rapidly along with scaling or oxidation of the metal surfaces. For medium or high carbon parts which are to be subjected to considerable stress in their ultimate use, loss of carbon as well as surface imperfections due to scaling, are serious problems. The answer to these problems is to heat the parts to forming temperatures which may be as high as 2350 to 2400° F in suitable muffles, and to surround the work in the muffle with an enriched nitrogen atmosphere. That this is not a laboratory experiment is shown by the fact that one wartime manufacturer of hollow steel propeller blades used 104,000 cu ft of nitrogen generator gas per hour for atmosphere forge furnaces, Fig. 5.

Heat treating finished parts usually calls for temperatures in the range from 1400 to 1700° F. The parts may be medium or high carbon steels or they may be gears or other parts which have been previously (*Please turn to Page* 120)

COMPOSITION, APPLICATION AND COST OF PREPARED ATMOSPHERES BASED ON NATURAL GAS AT $0.40 PER M CU FT

Type of Gas	COMPOSITION GAS CONSTITUENTS—% by Vol. CO_2	CO	H_2	CH_4	H_2O	N_2	Capacities Sizes of Available Units	APPLICATIONS METAL TO BE TREATED Copper	Low C. Steel up to 0.20 C.	Med. C. Steel 0.20-0.60 C.	High C. Steel Above 0.60	Special Steels	*Approximate Cost per 1000 Cubic Ft.
DX Gas (Lean) 40° F. Dew Point	10.5	1.5	1.2	0.0	0.8	86.0	200 to 25,000 Cu. Ft. Per Hour	Bright Anneal	.....	.....	.....	.....	$0.07
DX Gas (Rich) 40° F. Dew Point	5.0	10.5	12.5	0.5	0.8	70.7	550 to 20,000 Cu. Ft. Per Hour	.....	Bright Anneal	Up to 30 Min. Exposure Bright Anneal and Clean Harden	.....	.....	$0.09
NX Gas	0.2	1.5	1.2	0.0	0.0	97.1	1,000 to 20,000 Cu. Ft. Per Hour	Bright Anneal	Bright Anneal	Bright Anneal Clean Harden	Bright Anneal Clean Harden	.....	$0.10
RX Gas	0.0	20.7	38.7	0.8	0.0	39.8	500 to 3,500 Cu. Ft. Per Hour	Oxygen, O_2, is the only one of the common gases which reacts with copper; consequently, the atmosphere generator may de dispensed with in the bright annealing of that metal. It is only necessary to set the furnace burners slightly rich to prevent free oxygen within the furnace.	Carburize Dry Cyaniding	Carburize Bright Anneal Clean Harden Carbon Restoration (skin recovery)	Bright Anneal Clean Harden	.....	$0.23
Char-Mo Gas	0.0	34.7	1.2	0.0	0.0	64.1	500 to 1,000 Cu. Ft. Per Hour		Carburize	Dry Cyaniding Carburize Bright Anneal Clean Harden	Bright Anneal Clean Harden	Clean Harden Tungsten Molybdenum Steel	$0.43
AX Gas (Dissociated Ammonia)	0.0	0.0	75.0	0.0	0.0	25.0	1,000 Cu. Ft. Per Hour			.....		Bright Anneal Stainless Steel	$1.25

Quality Control

. . . an important factor in competitive production

By JEROME R. STEEN
Director of Quality Control
Sylvania Electric Products Inc.
New York

DURING the past decade it became evident that quality control activities on a greatly expanded basis offered untold possibilities for improving product uniformity and lowering production costs. Courses of approximately 100 hours duration were offered by many leading universities in the application of statistical methods both in night and in day school classes.

Full recognition of the potentials and appreciation of the basic methods underlying systematic quality control activities were not realized, however, until the publication in May 1941 of American War Standards Z1.1 and Z1.2. Demand for a maximum of war production became evident, thereby stressing the need for reduction of scrap and other waste during manufacture.

Today the need for, and importance of, systematic quality control during manufacture is recognized widely both with respect to the quality of design and to the quality of conformance. Quality of design depends to a large extent on an existing or prospective market and on whether the product may be competitive or is entirely new. It depends both upon economic and upon engineering considerations and is determined in advance usually by sales, management and engineering groups.

When design is determined for a competitive product, cost is a primary consideration. Cost must be balanced against quality however, or the product will not enjoy acceptance by the purchasing public. In the design of new products, however, stress should be placed first upon quality and later upon cost.

After a design has been established, quality of conformance is all-important. It must solve the problem of having each item produced conform as closely as possible with each other like item and with the requirements of the original design. Here also the cost of quality is an important factor and must be balanced against the benefits to be derived from quality lest we be confronted with the law of diminishing returns.

In Fig. 1, curve trends are shown in which the cost and the benefits of quality might be expected to vary relatively with respect to quality improvement. Examination indicates that there is an optimum point beyond which the cost of quality becomes uneconomical. The actual point where such a condition occurs can be determined best by co-ordination of the many groups concerned with distribution of the final product and with its cost.

Those persons in charge of quality control activities must consult frequently with members of their own engineering, purchasing, inspection, manufacturing, sales and executive groups as well as with representatives of customers, competitors and (*Please turn to Page* 126)

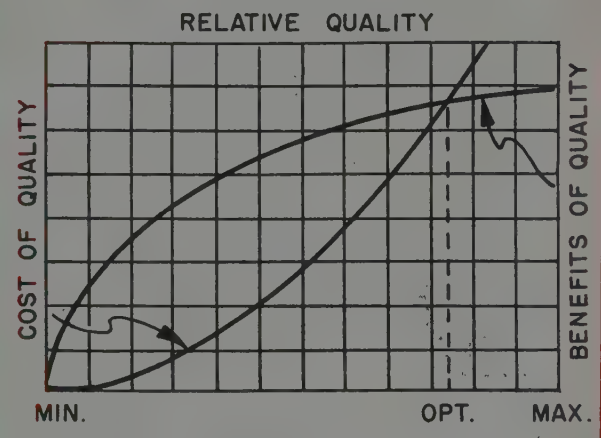


Fig. 1

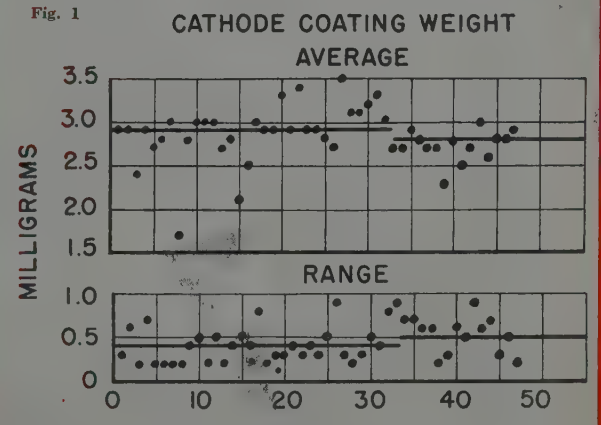


Fig. 2

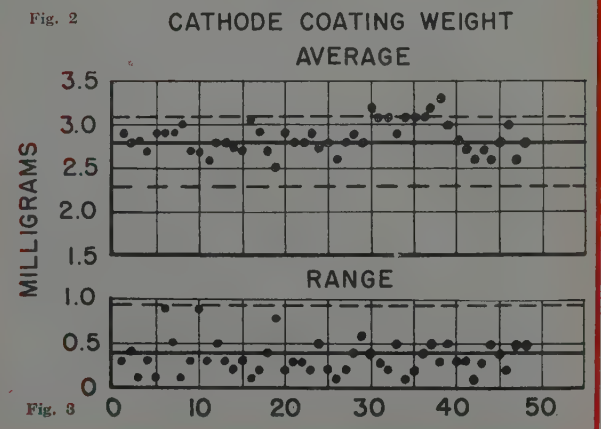
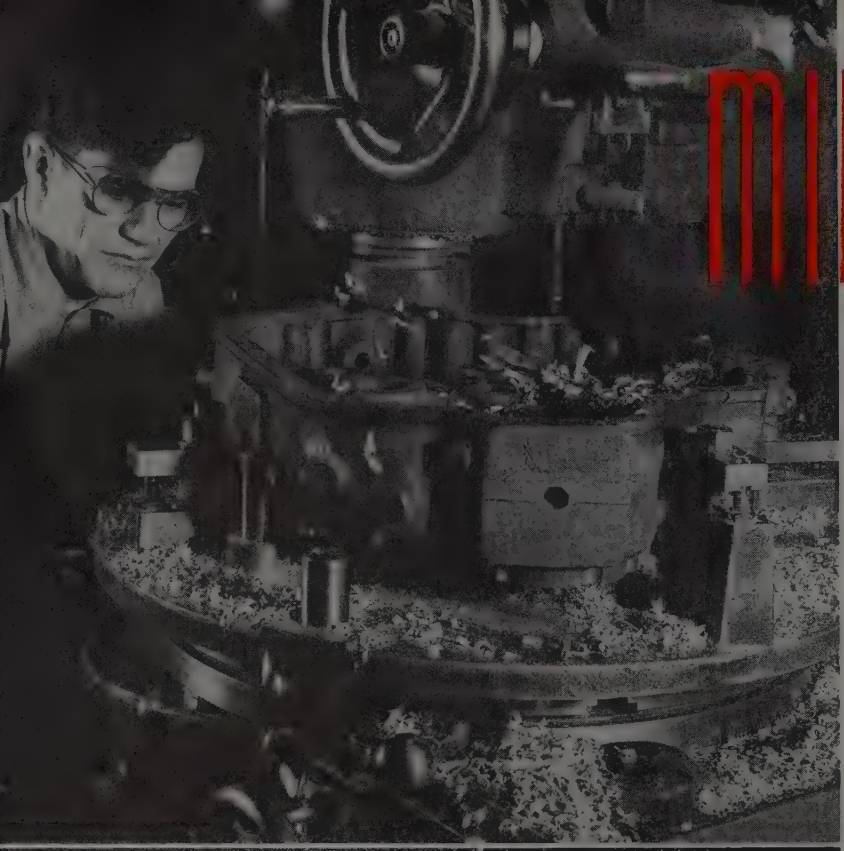


Fig. 3

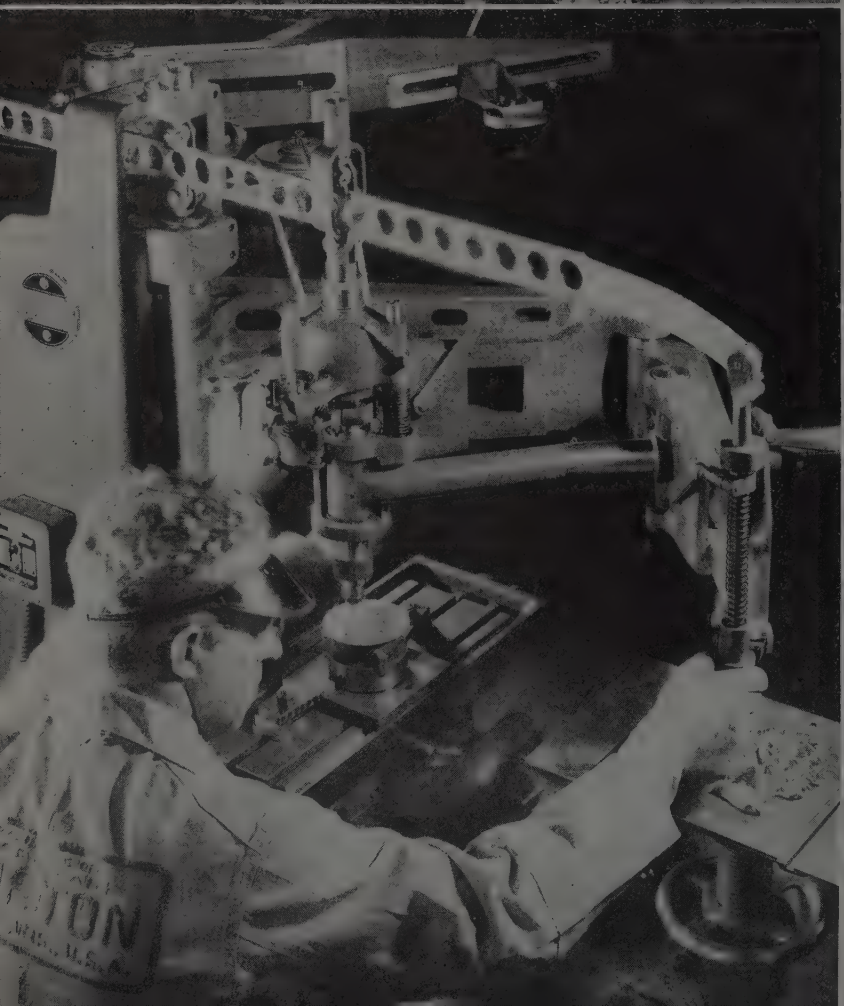


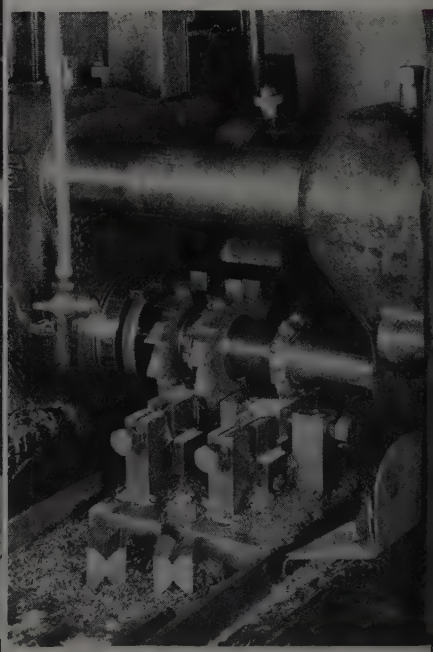
MILLING...

Part Five of a Series, and a Review of American Inventions in Milling Machines from Eli Whitney's Original Down to the Most Advanced

MODERN MACHINE TOOLS

By GUY HUBBARD
Machine Tool Editor, Steel





MILLING as a production operation is as typically American as apple pie. Here in the United States, milling actually antedates the single point tool planing processes dealt with in my article entitled "Surface Machining" which appeared in the June 30, 1947 issue of STEEL. Although records indicate that the French mechanic Jacques de Vaucanson was milling gear teeth as early as 1780, his cutters were nothing more than revolving circular files. Those used by Eli Whitney of Whitneyville and Col. Simeon North of Middletown, Conn., and by Capt. John Harris Hall at Harper's Ferry, Va. (now W. Va.) prior to 1820 were, however, real milling cutters and their machines were direct forerunners of modern milling machines.

The saga of the American milling machine is one of the most interesting in machine tool history and one of the best documented. It happens to be one in which I long have been interested and in which I have done considerable research—some independently and some in association with the well-known machine tool historian Joseph Wickham Roe, who unearthed for the benefit of posterity the original American milling machine built by Eli Whitney in 1818 or earlier.

That machine—now on exhibition at the Muscum of Science and Industry, New York—embodies basic design features, including power feed to work table, which I have traced directly down to modern milling machines through related and successively improved designs by Silver & Gay, North Chelmsford, Mass. (1820); the Robbins & Lawrence Co., Windsor, Vermont, (1848); and George S. Lincoln & Co. (now the Taylor & Fenn Co.) Hartford, Conn. (1855).

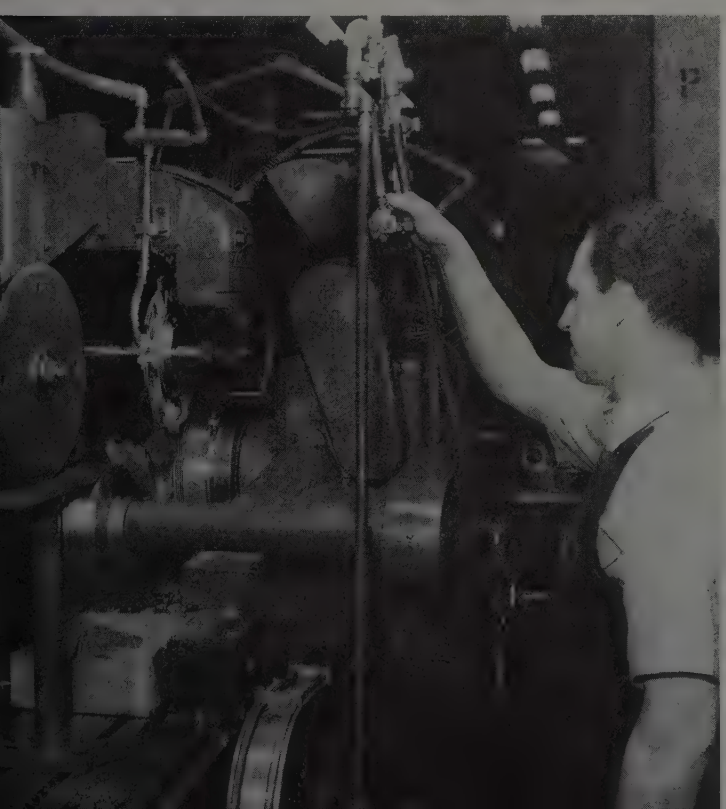
Frederick W. Howe, the Silver & Gay apprentice who lated designed the Robbins & Lawrence milling machines, eventually became president of the Brown & Sharpe Mfg. Co., Providence. He had considerable influence in early milling machine developments of that company. Francis A. Pratt, who redesigned the Robbins & Lawrence miller into the "Lincoln" miller in 1855, was one of the founders of the Pratt & Whitney Co., Hartford, in 1860. His company built untold thousands of improved "Lincoln" milling machines during the subsequent 50 years.

Men who "served their time" with Brown & Sharpe and Pratt & Whitney have in turn played important roles in milling machine developments in other important companies—including several in the middlewest. Thus the torch lighted by Eli Whitney at the very beginning of the interchangeable—or American—system of manufacturing has been passed from hand to hand down through the years.

In this article I want to pay deserved tribute to American milling machine builders of 1947 for the brilliance with which that torch burns today. That is as it should be. In the interchangeable system of manufacture the milling technique is one of the most important of all. In many plants it represents fully one-third of the operations and one-third of all machine tools involved.

Milling machines today are among the most highly diversified of all machine tools in size and in design. They range all the way from tiny bench machines which can be carried under one arm, to huge planer-type and floor-type machines weighing several hundred thousand pounds. Among the big machines, one very important class is that generally called "horizontal boring, drilling and milling machines" mentioned in my article on "Boring in the June 23, 1947 issue of STEEL as direct descendants of the horizontal boring mill developed in 1774 by John Wilkinson of Bersham for James Watt.

The latest models of these machines both of table-type and of floor-type, have had their milling capabilities and their milling attachments so expanded and multiplied and improved that I am inclined to believe that they should be called "milling, boring and drilling machines". They permit milling, boring and drilling to be done at one

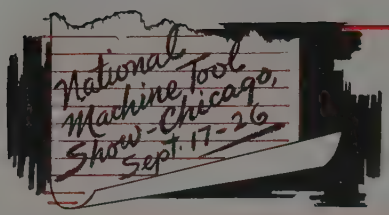


Upper left—This coarse-tooth, carbide-tipped cutter with inherent "flywheel effect" is being operated in Kearney & Trecker vertical milling machine with revolving table, cutting cast aluminum

Far left—Basic principles of form-controlled milling are demonstrated by this Gorton pantograph machine as it translates Lincoln medallion from plaster mold to steel die block

Center—How to accomplish several things at one pass is illustrated by multiple cutter setup for machining steel V-blocks in a Brown & Sharpe plain milling machine

Near left—Tracer controlled milling of cooling fins in Wright Cylone cylinder head. This thin cutter ran at 4500 surface feet per minute in Cincinnati Hydromatic



When the curtain rolls up on the National Machine Tool Show at the Dodge-Chicago plant, September 17, 1947, about the most surprised individuals since the awakening of Rip Van Winkle will be those who "know all about milling".

Probably more things have happened to milling in less time, than ever have upset the status quo of any branch of machine shop practice in the entire history of metalworking. All this will be brought out at Chicago.

setup, which is particularly advantageous on large work—including power plant, railway and marine work, both steam and diesel. On the cruise which I took with the machine tool builders on the U. S. S. FRANKLIN ROOSEVELT about a year ago, I was interested to note that one of these machines of standard design was a key factor in the main repair shop on board that big aircraft carrier which speaks volumes for its versatility.

Planer-type millers are relatively recent and direct relations of the single-point tool planers dealt with in my article on "Surface Machining" in the June 30, 1947 issue of STEEL. In a number of cases they are built by planer manufacturers. Outwardly they look like planers. Mechanically and electrically, however, they differ considerably from planers in that their tables or platens are designed to travel at "milling feed" rates and their side heads and heads on cross rail are heavily powered revolving spindle units instead of the "clapper-block" units on planers.

This involves considerable ingenuity in getting power to these heads without hampering their freedom of up-and-down and cross adjustment. In most cases the splined power shaft method is followed. As in the case of regular planers, these machines are built both in double housing and openside designs.

Some of the earliest and best customers for these machines were the machine tool builders themselves. Today one of the best ways to become familiar with their effective use is to visit one of the large machine tool plants wherein planer-type milling machines are used for taking heavy, multiple cuts on bed and frame members. As in the case of planers, it will be found that small work is "ganged up" in ingenious ways on these machines to keep them busy between the big jobs.

Below, on this page of this article is illustrated a heavy duty milling machine which combines functions both of milling and planing—although it is a very special kind of planing. This machine, shown as set up on a cylinder head job, is a Newton combined milling and "shaving" machine, built by Consolidated Machine Tool Corp., Rochester, N. Y.

As the milling cycle starts the shaving head retracts to allow the work to pass the milling cutter, which roughs it out. Then the shaving head moves into cutting position and as the table returns at rapid traverse speed, the shaving blade removes the cutter marks and brings the work to exact size. This is a good example of effective utilization of what otherwise would be an "idle operation" of a machine tool. It becomes more and more evident that "idle time is out in modern machine tools."

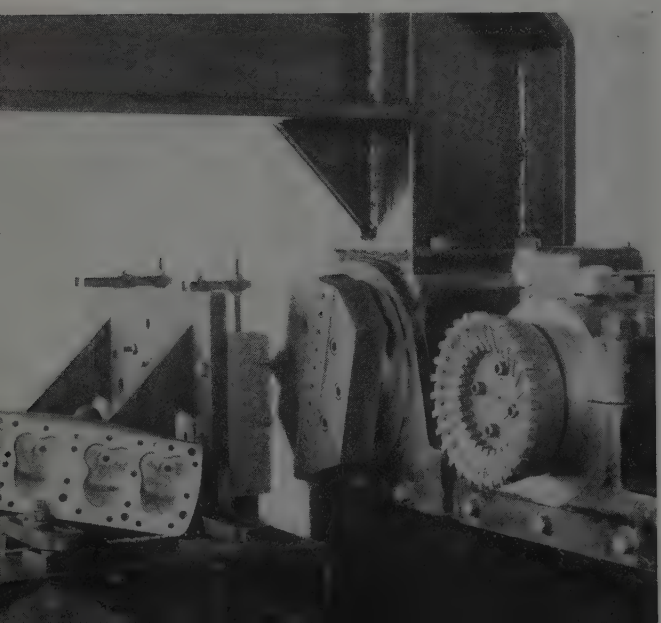
Having wandered a bit off the beaten track of conventional American milling machine development in order to take a look at some of those types which are closely related to other machine tools dealt with in foregoing articles, let's get back again on the main trail which has come directly from Eli Whitney's shop.

His first machine—a small bench miller of horizontal spindle type, with power feed to the table—was the ancestor of the present big family of standard machines which includes: Hand millers, bench millers, plain millers, manufacturing millers, knee-type millers, universal millers, bed type millers, etc. Other machines which deviate more from his basic design are the various kinds of vertical spindle millers—of which heavy models of "goose-neck" design are widely used today on production work.

The most familiar type of milling machine is that of knee type, in which the table can be raised and lowered by moving the heavy, overhanging knee. This may be either plain—for the simpler manufacturing operations—or universal, for a wide variety of tool room and other complicated operations involving index and spiral milling, etc.

Some of the heaviest and most powerful standard milling machines built today are of knee-type. As in the radial drill and the openside planer, clever engineering has given them the rigidity to stand up under heavy duty. The universal milling machine originally was primarily a tool room machine, but today big batteries of them are used on exacting production work. It is the familiar story of tool room equipment penetrating manufacturing shops because of the demand therein for the same accuracy and convenience as in the tool room.

The transformation of milling machines from light weight, slow running mechanisms to husky, high speed mechanisms, began with the (*Please turn to Page* 118)



This heavy duty Newton machine, built by Consolidated Machine Tool Corp., removes bulk of the metal with milling cutter at one pass, then finishes work with shaving blade during table return

FABRICATING *Aluminum Air Ducts*

MOST shops fabricating aluminum air ducts for the heating, ventilating and air conditioning industry prefer to use coiled sheet because it eliminates the need for handling individual sheets. The following is a description of a typical setup that many shops have found useful.

Material for fittings may be used directly from the coils but all coiled sheet to be used for flat sections must be run through a roller leveler to flatten it. This can be done readily by setting up a 4 or 5-roll leveler at the end of the layout table. Then the coil of aluminum sheet is brought up from stock on a dolly. The coil sits on two ball-bearing rollers mounted on top of the dolly. These permit the coil to turn freely so even the largest and heaviest coils can be unwound with little effort.

Other shops have made reels and reel stands from pipe to hold the coil level with the run-out table, straightener and shear. In any case, the end of the coil is fed through the roller leveler and into a pair of rubber covered pinch rolls fitted with a crank so these rolls can be turned to pull the sheet through the leveler as it unwinds from the coil. Or a standard slip roll former can be used for straightening and uncoiling the sheet. Either arrangement is low in cost, widely adaptable and can be operated by one man.

From the straightener and feed rolls, the metal goes into a shear for cutting the sheet to length and squaring the ends, and from there on out to the layout table. Most shops prefer a rather long layout table so several men can be laying out sections at the same time. Large shops will employ some form of mass production and instead of making the parts piece-by-piece will make "runs" or lots of several hundred at a time, setting up stops on shears for accurately duplicating parts with straight-line outlines.

Curved and irregular parts such as elbow checks, stack head checks and the like may be cut out in lots of several hundred at a time. A stack of blanks up to 2-in. or more in thickness can be cut to shape by clamping and cutting as a unit on a contour saw or profile type of band saw. Usual practice is to scribe the outline of the shape wanted on the top piece and cut to the scribing free hand. Small deviations are usually not serious.

Shapes too large for the contour saw may be cut out on a nibbler. Portable power nibblers and contour saws are also available. Or the shapes may be stacked and routed from a template, the method widely utilized during the war to produce blanks for aircraft parts.

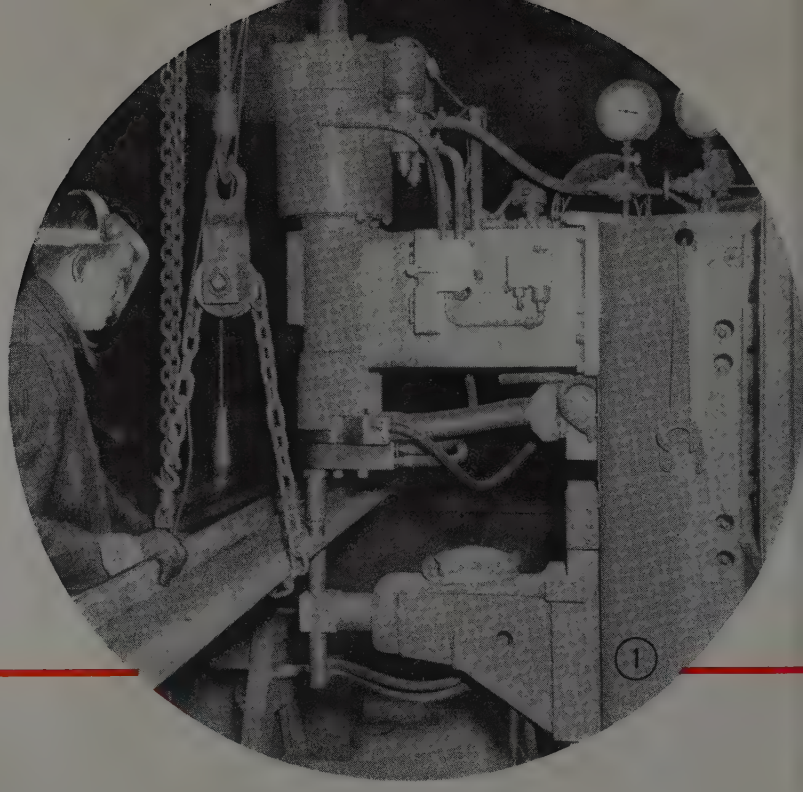
Aluminum in 2S-¾H material will readily take any type of mechanical interlocking joint design including the Pittsburgh lock seam produced in lock-forming machines. No change in setting of the machines is required for aluminum. It forms perfectly with same settings on shears, lock formers, etc. as used for galvanized or black iron of same thickness. Ordinary grooved, single seamer machines will make round pipe. Aluminum for round pipe is crimped and beaded in the same manner as other materials and on the same machines with the same settings. Square ducts are usually made with top, bottom and sides as separate pieces, or top and side as one piece, bottom and side as the other, depending upon size of the duct.

A number of sheet metal shops point out that Pittsburgh lock seam assemblies should not be malleted shut completely when making shop assemblies, because some difficulty may be encountered that will necessitate changing it slightly in fitting the duct on installation. This changing usually requires opening of the Pittsburghs and subsequent closing.

Aluminum may not always withstand this repeated sharp bending and rebending, so they recommend closing only an inch or two of the Pittsburgh at intervals of 8 to 10 in. along the seam when assembling ductwork in the shop. This facilitates opening if changes are required. Of course, more accurate measuring of the jobs before fabrication will assure proper fits and eliminate any need for changes during erection. (*Please turn to Page* 124)

Three individual aluminum ducts leading into main exhaust line, part of large ventilating system in an industrial plant

System puts balanced load on all three phases of power line, extending scope of resistance welding processes and lowering substantially power demand



Three-Phase

OPERATION of resistance welding equipment has always presented a serious power problem from the viewpoint of the public service company supplying power to the user of this equipment. This has been due to the fact that the conventional resistance welding machine operates at low power factor, usually below 30 per cent, and has a high kva demand for relatively short periods of time.

This single-phase load on the usual three phase supply system can produce unbalanced conditions in the three-phase supply with the resulting disturbances in the voltage conditions on the three phases. Furthermore, in those installations in which synchronous control is not used, and there are a considerable number of older installations without it, transient currents reaching peak values up to two times the steady state peak currents will be drawn at the start of each weld impulse.

Another factor to consider in the operation of single phase welding equipment is that as the material being welded is introduced into the throat of the machine, the current passing through the secondary circuit decreases due to the increased secondary throat impedance, thus causing decreasing of the heat in the weld and consequently decreasing weld strength somewhat with each further movement of the work into the throat of the machine. This usually is taken care of by installation of current compensating devices which function to maintain constant current in the secondary of the welding machine.

In alternating currents, moreover, it is a well known fact that the alternating current resistance is increased above the value of the direct current resistance due to the phenomenon known as skin effect, the current flowing near the surface of the conductor—the depth of penetration decreasing with an increase in frequency. From the many tests conducted on welding apparatus, it has been found that the ratio of alternating current resistance to direct current resistance is in the neighborhood of 2.3 at a frequency of 60 cycles per second.

During each half cycle of the 60 cycle current, heat is developed in proportion to the square of the current. If a graph of current squared is drawn, it can readily be seen that the curve rises rather sharply, indicating production of heat in the weld, reaches a maximum and then starts dropping off with consequent dropping off in the

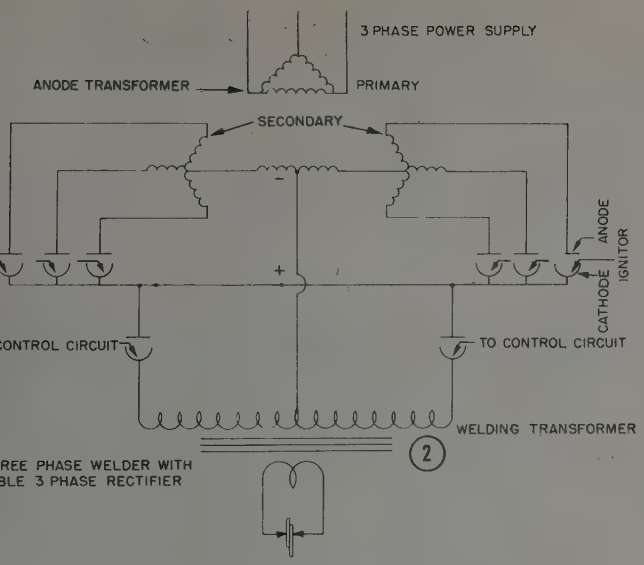


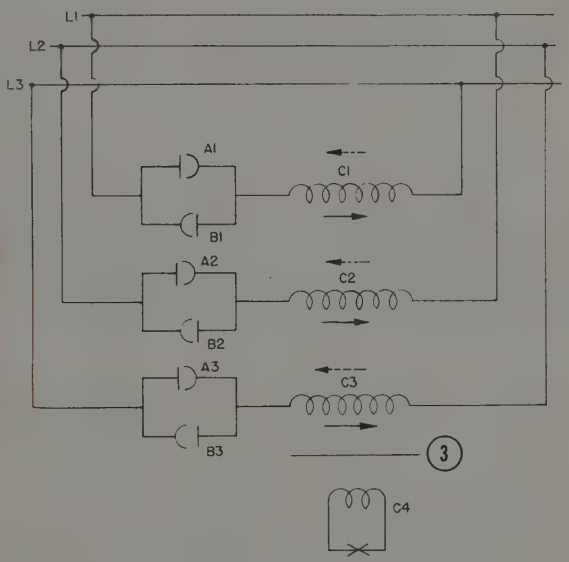
Fig. 1—Portable unit designed for welding structural sections. Typical installation at Duffin Iron Co., Chicago

Fig. 2—Three-phase welder powered by double-three-phase rectifier

Fig. 3—Three-phase three-winding welding transformer

Fig. 4—Oscillogram of line current on a three-phase half-wave rectifier supplying a three-phase single-phase welder

Fig. 5—Oscillogram of the line current in each of the lines supplying a double three-phase rectifier connected to a three-phase welder



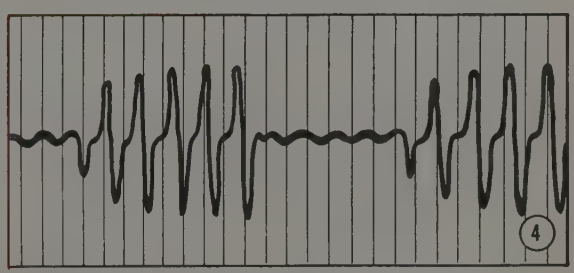
By J. L. SOLOMON
Electrical Engineer
Sciaky Bros. Inc.
Chicago

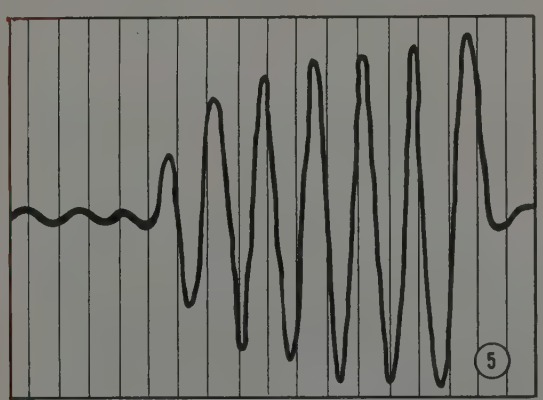
Welding

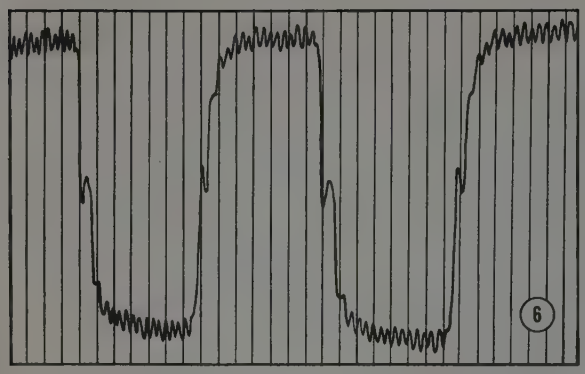
production of heat. This means that for each half cycle there is a period during which the welded area is heated and then allowed to cool slightly.

During each half cycle there is a production of heat, after which the production of heat drops off and the heat is allowed to dissipate in the material which is being welded. These blank spaces in the heating curve indicate that a much higher peak value of current is required when using this type of a wave if welding were done with a continuous current. Although one might say the definition of the current of a sinusoidal wave takes into consideration the actual heating effect of the total wave, it must be remembered that this definition is based upon the fact that the heat that is produced by each type of current is not allowed to dissipate into the surrounding medium.

In practical applications where the heat as it is produced is allowed to dissipate, there must be considered the fact peak currents will have to be much higher than is indicated by the ratio of rms to the peak value. With a wave shape of current as in Figs. 6 and 7, the production of heat (I^2RT) during the weld is steady, since there is no removal of the load during the impulse, and as a con-







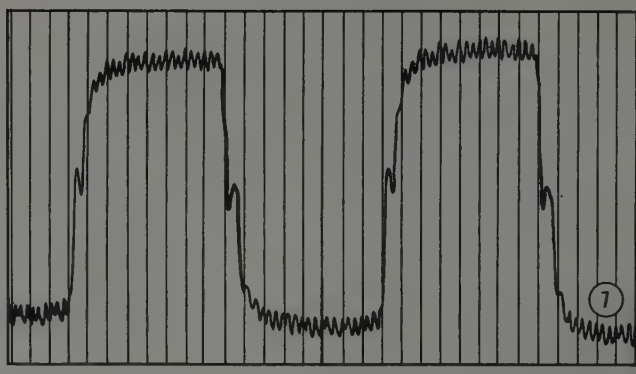


Fig. 6—Oscillogram of secondary current, three-phase welder, frequency 5 cycles per second

Fig. 7—Oscillogram of secondary current, three-phase welder, frequency 3.75 cycles per second

sequence, no loss of heat. The peak current, therefore, does not have to reach as high a value as the rms of an ac wave to produce the same heating effect in the same time. A number of systems have been devised with the object in mind of reducing the kva demand on the power supply, and improving the power factor.

One of these systems makes use of a motor generator set with a large flywheel on the shaft so that there is a great deal of energy storage which tends to soften the kick of the welder load on the line. The motor is a high slip type operating from the three phase line. The generator may be wound for low frequencies so as to take advantage of the lower secondary impedance and resulting lowered demand of a welder operating at low frequencies. Systems of this type, where the generator delivered power to a welder at frequencies of 16-2/3 cycles per second, were successfully installed in France in recent years. This system has one great disadvantage, namely, the initial cost is very high.

Another system in popular use is the installation of series capacitor power factor correction equipment. The welding load may be power factor corrected by the installation of series capacitors so that the system operates at near unity power factor instead of around 30 per cent, thereby reducing the kva demand in proportion.

In this system the use of additional equipment, in the form of a bank of series capacitors, auto transformers, high voltage synchronous control equipment, discharge resistor to discharge the series capacitors, over-voltage protective equipment and cabinets for housing, adds to the original cost. A welding transformer wound for the nominal line voltage may be used in conjunction with an auto transformer, or the welding transformer may be wound for the high voltage required by the use of series capacitors.

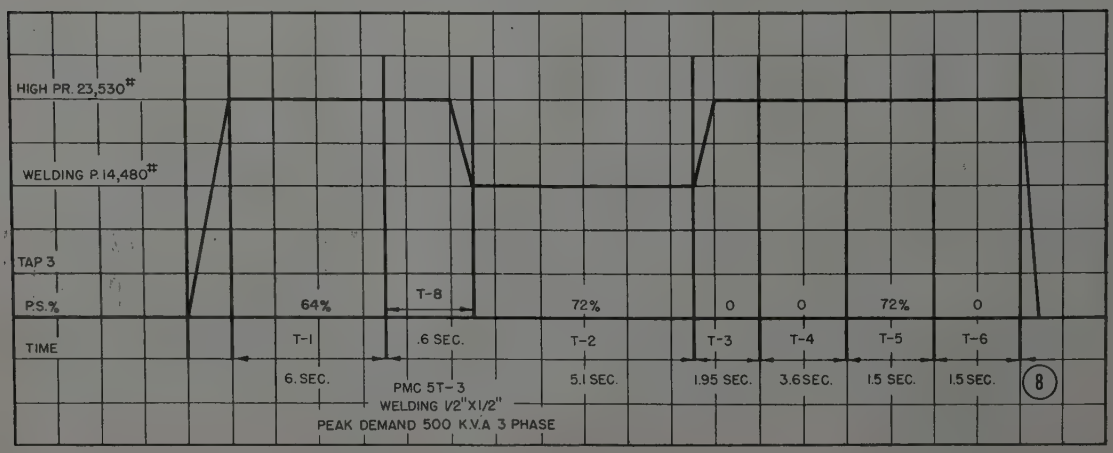
The voltage, in the case of welding transformers having a power factor of 25 per cent, would be around 1800, in the event that the power supply was 460 volts. Some safety precautions are required. Installing series capacitor correction equipment, cost of capacitors will be about $4 per uncorrected kva.

The stored energy type of apparatus allows the use of direct current for performing the welding operation, and the rectifiers used in this type of equipment can be very readily made to operate from a three phase power supply. This type of equipment is entirely satisfactory for the welding of aluminum and other materials requiring high peak currents of short duration, but is not very satisfactory for the welding of steel.

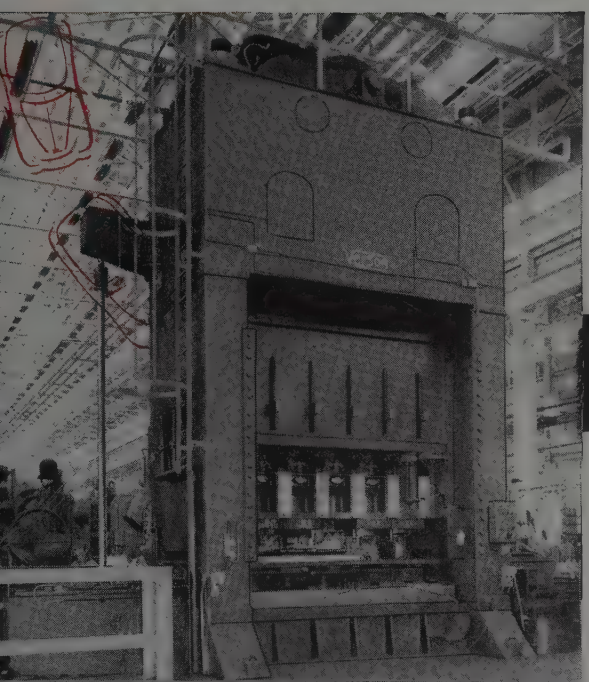
In order to perform a given welding operation upon steel with a minimum requirement in power, and in order to allow the three phase system to be used to advantage, the system known as the three phase single phase system has been developed. In this type of welding apparatus the three phase power supply feeds a rectifier which supplies direct current to a welding transformer.

Controls for the system may be either mechanical or fully electronic, depending upon the application of the machine. Fig. 2 represents a system of this type. Electron current from the rectifier, in this case a double three phase six tube rectifier, is allowed to pass in one direction through the welding transformer, from the negative through one of the reversing ignitron tubes, which is made

Fig. 8—Typical welding current and pressure settings on welder in welding ½ x ½-in. scaly steel



A Real Producer



e-up showing progressive stages of this manufacturing operation

ompleted brake drum disks being discharged from the press

- 5 operations simultaneously on brake drum disks!
- 5 individual slides!
- 1200 tons total capacity with one station having 700 tons capacity!
- 120 inches between housings!
- Weight over 500,000 pounds!

this Verson press

. . . is speeding the production of vitally needed automobiles

With the Verson Transfer Feed Press illustrated above five operations are performed automatically in a single press. Stock is fed into the right hand side of the press and completely formed brake drum disks are discharged at the left. Already applicable to the manufacture of coaster wagons, cooking utensils, refrigerator dehydrator pans, stove parts and many other concentric or symmetrical pieces, this method of manufacture is rapidly spreading to other fields of mass production.

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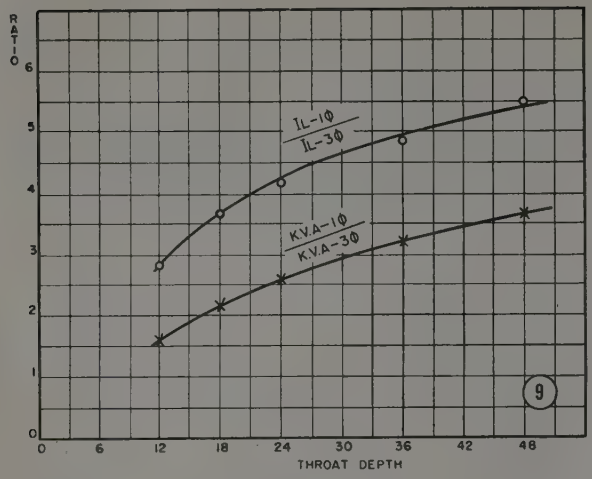

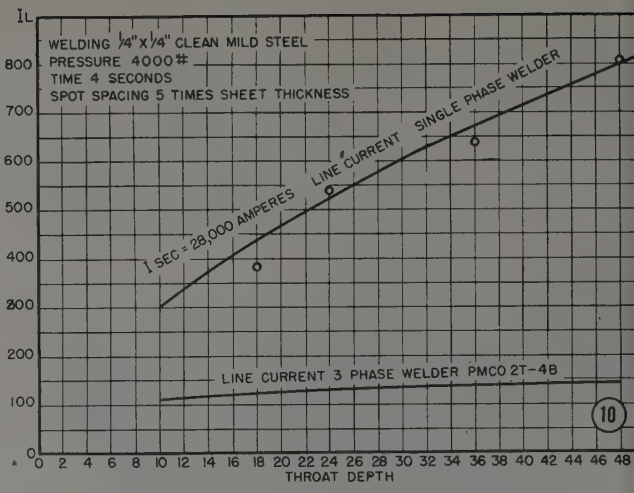

Fig. 9—Kva demand versus throat depth for single-phase and three-phase welders

Fig. 10—Line current versus throat depth for single-phase and three-phase welders

conductive, and back to the positive of the rectifier.

A control circuit is so arranged that it allows the rectifier to fire through the welding transformer and one of the reversing tubes for a period of time which may be preset from one to 10 cycles of the 60-cycle line. After this initial period, all tubes in the rectifier are made nonconductive, and immediately thereafter made conductive again, except that current is allowed to flow through the second half of the welding transformer since the second reversing tube is now made conductive.

During each impulse of "on" time the current in the primary rises exponentially, its shape depending upon the parameters of the welding circuit. The resulting changes in field in the iron core induce a voltage in the secondary which in turn forces the welding current through the secondary circuit and the material to be welded. The shape of the secondary current will, therefore, be as indicated in Figs. 6 and 7. It starts at zero, rises exponentially, continues for the "on" time period, drops to zero, and then reverses its direction and rises again in the opposite direction following the same shape of current wave it did previously. It thus forms a complete cycle which in a way represents a single phase current of low frequency. The frequency in the secondary can be varied at will by increasing the length of the "on" time pulse; for instance, if the "on" time pulse is one cycle, the frequency in the secondary circuit will be 30 cycles per second. If the "on" time pulse is 10 cycles, the frequency in the secondary circuit will be three cycles per second.

Another form of a three-phase welder is illustrated in Fig. 3. This type of apparatus eliminates the use of a separate rectifier in that both the rectification action and transformation action are realized on one iron core by the use of the patented three-phase single-phase principle. The welding transformer is made with three separate primary windings and one low voltage secondary.

Referring to Fig. 3, we see three groups of primary coils: C1, C2, C3, secondary C4—and two sets of Ignitron tubes: Group A1, A2, A3, and group B1, B2, and B3.

By suitable control means, Ignitrons A1, A2 and A3 are allowed to become conductive for a preset interval of time, thus allowing electron current to flow in turn through coil group C1, C2 and C3, in the direction shown by dotted arrows. Ignitron group A is then rendered nonconductive and Ignitron group B is rendered conductive for the same period of time, thus allowing current to flow in the direction indicated by the solid arrows.

This means that the current in the

(*Please turn to Page* 137)

TABLE I

	Preheat	Welding	Quench	Annealing	Forging
Pressure	23,530	19,910	23,530	23,530	23,530
Current	47,000	78,500	0	78,500	0
Time	6 sec.	5.46 sec.	3.95	1.5	1.5
Kva Demand	230	532	0	532	0

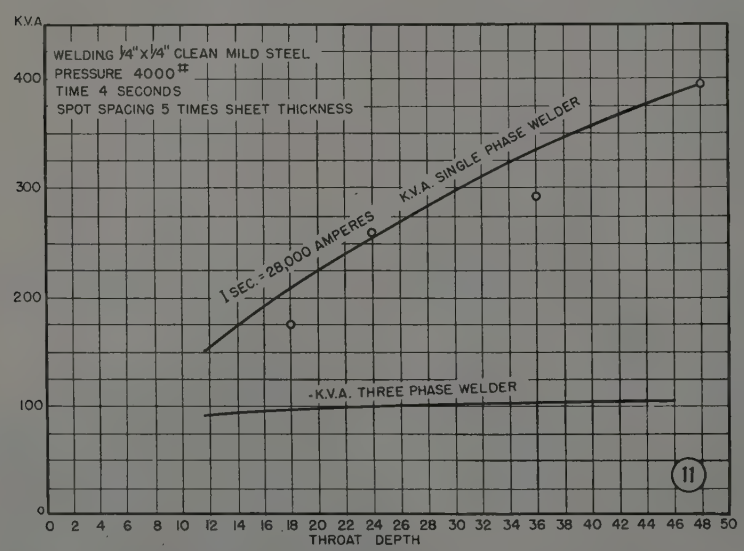

Fig. 11—Ratio of line current of single-phase welder to line current of three-phase welder, and ratio of kva single-phase against three-phase

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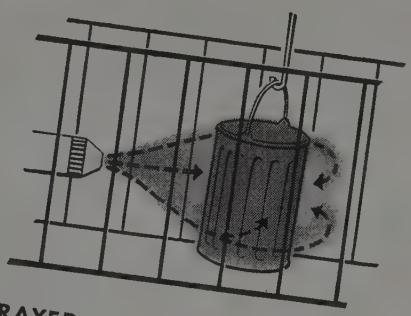

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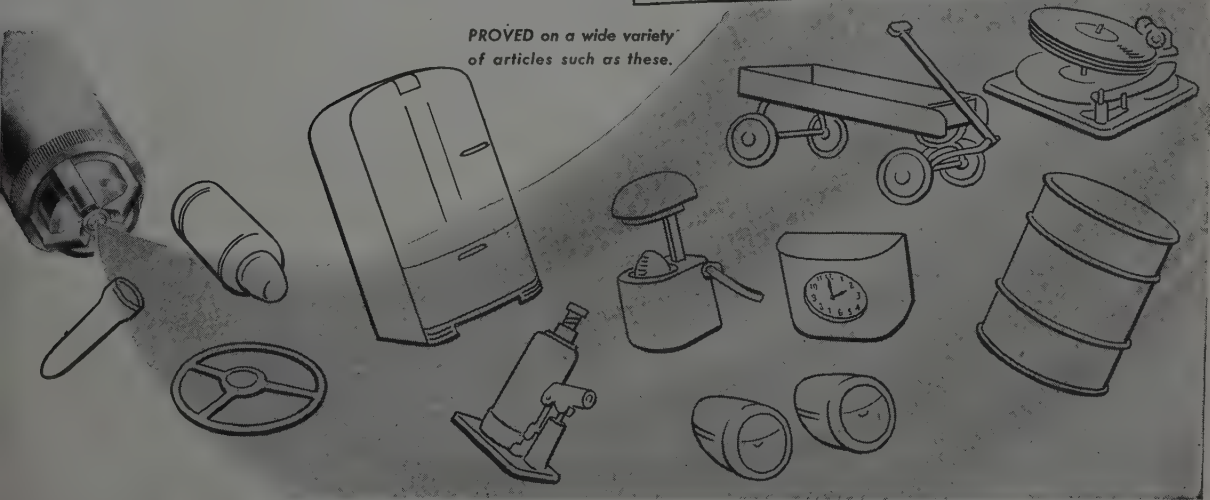

C9409

Engineering News *at a Glance*

MORE CARBURIZING STEELS: To meet the need for deep hardening steels that can be easily processed and machined into airplane, truck, bus and other gears, shafts and pinions subject to heavy-duty service, Carnegie - Illinois Steel Corp., is offering a new series of four improved carburizing steels under the trade name SuperKore. According to the corporation, the steels show hardenability equal to or greater than more highly alloyed grades now in common use. They also are easier to anneal and possess substantially improved machinability.

AUTOMATIC PORTER: When boarding one of the Pennsylvania Railroad's new postwar cars, passengers step from the vestibule into a newly designed open entry, treated in stainless. At the left side of this area is a door, containing a large window for better vision. This opens inward at the nudge of a horizontal hand bar, and remains open for several seconds before closing gently. It operates by pneumatic pressure actuated by power from the electrical system of the car. If while the door is closing, another passenger should start through the doorway, the door will again open automatically the moment any part of it touches the passenger or his baggage.

"PICTURES" OF QUALITY: In Lansdale, Pa., Hunter Pressed Steel Co., maker of springs, has initiated a new service to improve customer-supplier relationships. Prior to making a delivery on an order the company sends the customer—if desired—a "QR" or quality report by mail immediately after final inspection. The report usually arrives in advance of the shipment, and may be related to it easily through a report number. The "QR" is a copy of the final sampling report regularly made by Hunter inspectors. It is in form of a frequency distribution of the test load values, and presents the information most needed in a manner most readily understood.

WELL BRAKED: Two entirely independent air brake systems provide unfailing reliability in stopping the new super duty six-wheeler truck developed for far-western states operation by Mack Trucks Inc., New York. Large brake block area and air chambers achieve fast, positive and simultaneous braking in all wheels. New smaller diameter, wider rear brakes with more than 1000 sq in. braking area, assure proper cooling of drums and tires. For emergency stops, a separate air chamber on each of the four bogie wheels is actuated by a separate reservoir and valve system. Capacity of the emergency system is enough for several normal stops.

"IRON CURTAINS": "Twin" wrought iron plate fire walls 5/16-in. thick were recently installed on piers L and S operated by Norfolk & Western Railroad at Lambert Point, Va., in order to prevent below-deck spread of fire. According to A. M. Byers Co., Pittsburgh, the iron curtains extend the entire width of each pier, spaced at intervals of about 300 ft along the length of the piers. Walls constitute a "double curtain" of protection since there is approximately a 10-ft space between the vertical wrought iron plates. Ends of each fire wall at the sides of the pier were closed by additional wrought iron plates, thereby forming virtually a sealed chamber 8 ft wide. Both faces of each double firewall are protected by open sprinkler heads, spaced 5 ft apart and 2 ft away from iron plates.

INSULATION IN SUPPLY: High silica content insulation, known as Refrasil, developed by H. I. Thompson Co., Los Angeles, Calif., for aircraft jet engine cones and tail pipes, is now being made available to industry in general. According to the West Coast company, the product was proved physically efficient and chemically stable at sustained temperatures at 2000°F, and safe at 500° higher for short periods. Fibers of the product do not have a sharp melting point. They start to soften at 2300 to 2400°F, but do not actually fuse until about 3100°F. The concern is making the insulation available in batt form, by the roll about 14 feet long by 3½ ft wide and 3/16-in. thick, and in cloth form in rolls of random lengths approximately 32 in. wide by 0.015-in. thick.

RECOVERS 90% IRON CONTENT: New washing tower method of concentrating low grade iron ore, developed in Germany, doubles the ore concentration and results in recovery of over 90 per cent of the iron content, the Office of Technical Services reports from Washington. Although the Wiedelmann tower, as it is called, is a new application of the gravity separation principle, long applied in the United States, its comparative cost cannot be determined without test runs using American ores, according to Frank D. Lamb, chief of the mineral dressing unit, U. S. Bureau of Mines Experiment Station, College Park, Md. In test runs, the tower, which could be used in Minnesota, Pennsylvania, Tennessee, Alabama and other regions, recovered for the Germans 91.6 per cent of the iron ore content with an increase in iron ore concentration from 21.6 per cent in the raw ore to 38.9 per cent in the washed product. Wiedelmann the inventor, states that ores washed by this process required the addition of less lime to the blast furnace than did ores washed by methods in which the lime is largely removed. In some cases, no additional lime was needed, he said.

MAKES TRAIN NOISELESS: Few pieces of rubber located at strategic points carry the entire weight of each car in the General Motors "train of tomorrow", now on a nationwide tour. Noise is so thoroughly sealed off that interiors are as quiet as the average living room. The rubber, newly developed by scientists of United States Rubber Co., New York, is used chiefly in noise dampening devices placed between the truck and body of the cars to intercept rattle produced by the wheels rolling over the steel rails. The company also produced special plastics for the project. These were furnished in 17 different colors, and are used in the train as flooring for the coaches and the passageways of the Pullmans, as well as wall covering below windows.

"TIPLESS" AT CORNERS: Steel grid conveyor belt, designed by Cyclone Fence Division, American Steel & Wire Co., Waukegan, Ill., turns corners without tipping, describes complete circles if necessary, and can be used to move products uphill or down or straight ahead horizontally. Its construction permits air circulation required for cooling products in motion. The division reports section of the belt 2 ft wide weighs only 3 lb per linear foot. It is being fabricated in bright, galvanized, tinned or stainless steel wire to meet various special manufacturing operations.

SUPPLIES FOOL-PROOF LOCKS: In Albany, N. Y., Simmons Fastener Corp. reveals that the War Department recently selected its Quick-Lock fastener which embodies special design and construction features, to seal the 250,000 steel caskets to be used in returning World War II dead for final burial in the United States. In accordance with the War Department's requirements, the fastener leaves no possibility of human error in sealing the caskets for shipment, and it meets severe shear and tension loads under air pressure tests.

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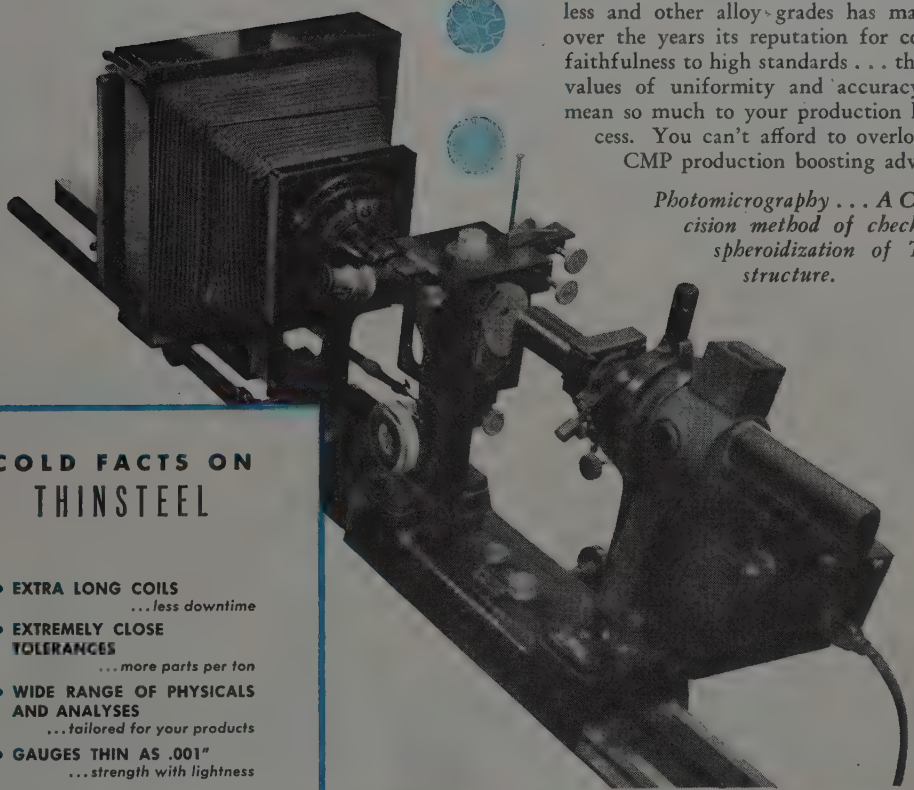

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Electrochemical Meeting Reveals

NEW METALLURGICAL DEVELOPMENTS

. . . in electric furnace practice, corrosion and electrochemical behavior

WELL-ROUNDED agenda of technical papers in which were described many new metallurgical developments featured the 91st convention of the Electrochemical Society at Louisville. Sessions on electric steel, corrosion, and electrochemical behavior of metals were highlights of the meeting.

Opening the scientific-technical session on electric steel, C. G. Merritt, Crucible Steel Co. of America, New York, presented a paper which traced the growth and present status of electric steel practice in this country. Steelmaking, in general, by all methods of manufacture currently used, has improved in the last twenty years. Many items formerly made exclusively in the electric furnace are now made in the basic open hearth. This is unquestionably due to impovements in basic open hearth melting as quality requirements have been satisfactorily maintained.

As new alloys are required, according to Merritt, the electric furnace is the one which produces results. The first experimental melts are generally made in small induction units, and the arc furnace ultimately puts them into quantity production. Gas turbines and jet propulsion units require many new alloys for highly stressed parts operating at elevated temperatures. Some of these metals can hardly be called steel, since many of them contain alloying elements in excess of their iron content, and some of them contain only small amounts of residual iron.

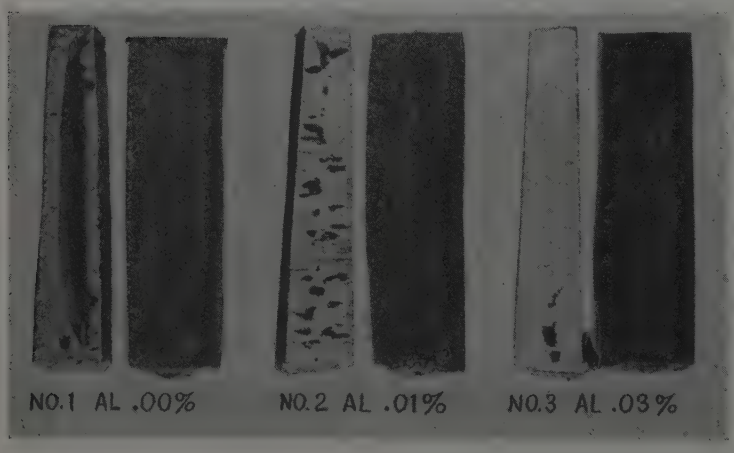
These alloys, as well as the entire family of stainless and heat resistant steels, are at present produced in the electric furnace.

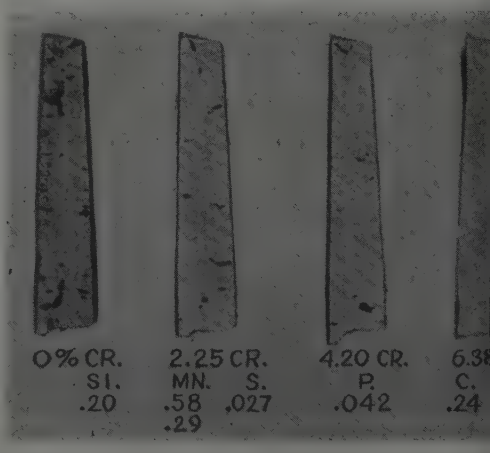
Design engineers are quick to take advantage of the use of metals which can be used safely at high tensile values. In the constant battle to produce light construction, the weight/strength ratio becomes very imporant. In such designs it is imperative that the metal be uniform and free from defects. In this connection, it was reported by Merritt that a new material has been developed quite recently, primarily for aircraft construction, which very possibly will permit a still lower reduction in the weight/strength ratio of highly stressed aircraft parts. This metal has a relatively low alloy content, the chemical composition being approximately 0.25 per cent C, 1.30 per cent Mn; 1.50 per cent Si; 1.80 per cent Ni; and 0.40 per cent Mo. When heat treated to a tensile strength of 240,000 psi it maintains approximately 15 per cent elongation and 45 per cent reduction of area in a longitudinal test. Another feature is the unusual Izod impact strength.

Acid Electric Steel For Castings: Continuing the session on electric steel Sam F. Carter and C. K. Donoho of American Cast Iron Pipe Co., Birmingham discussed the use of acid electric steel for castings, in which it was shown that the acid electric furnace is an efficient medium for the production of the highest quality steel for castings. Highest ductility was obtained by maintaining a relatively oxidizing bath throughout the heat and deoxidizing by simultaneous addition of silicon and manganese to the

Fig. 1 (left)—Effect of residual aluminum content on 0.35 per cent carbon steel cast in 5 per cent moisture sand

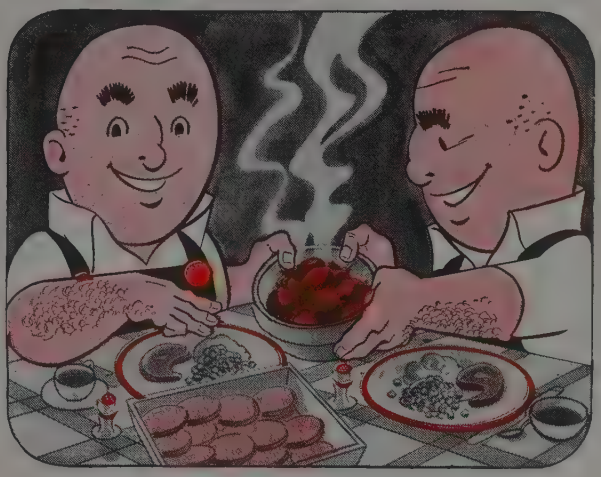
Fig. 2 (right)—Effect of chromium content on soundness of medium carbon steel cast in 5 per cent moisture sand



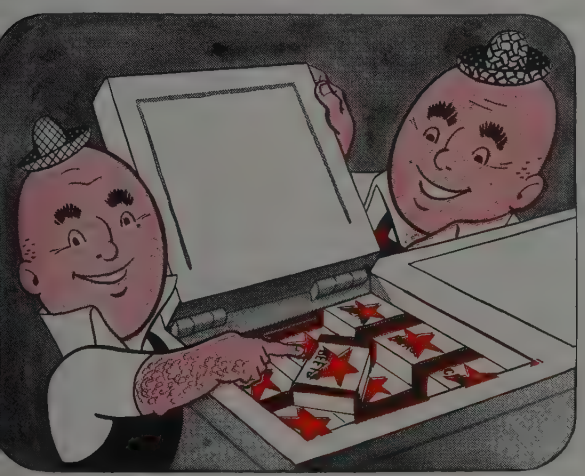


Your stomach can't tell winter from summer

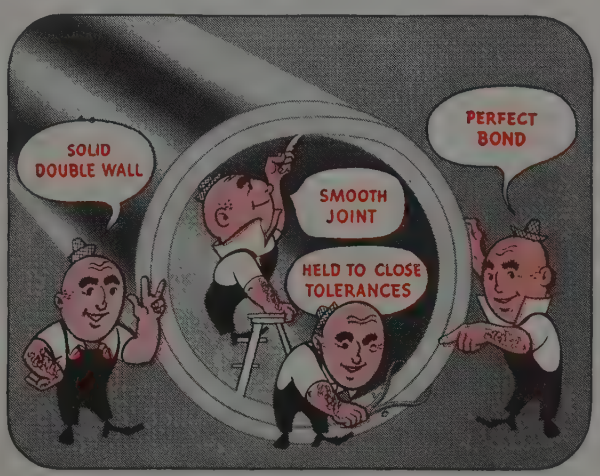
GARDEN-FRESH peas and corn are tempting lures for many people, while others prefer juicy garden beets or asty lima beans. Whatever the choice, they agree on this—he fresher, the better! Housewives today can answer this all, even in winter. But they need help to do it.



2. SILENT PARTNER in preserving summer freshness all year around is the modern freezer unit. At home or in the store, these units keep food so super-fresh, you can't tell by tasting whether it's winter or summer. But freezing units themselves need help to do this job well.



3. BUNDYWELD tubing in condenser and evaporator coils, compressor lines and connecting tubes helps bring ependability in freezer units. Bundyweld's many other uses nclude carrying fuel, oil, lubricants, vacuums and hydraulic uids in motor vehicles and gas in modern ranges.



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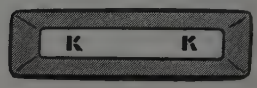

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bath shortly before the tap. Final deoxidation with aluminum was shown to be valuable in preventing pin-holes but tends to lower ductility. The point was brought out by Carter and Donoho that the control of melting practice, composition and casting conditions to produce aluminum-free castings which are radiographically sound gives the best strength ductility combinations in cast steel.

First phase in the acid electric process, the carbon boil, has been almost universally accepted as necessary where consistently high physical quality is required. An oxidizing agent such as ore or mill scale is added by the time the charge is melted. At this low temperature the silicon and manganese in the charge are oxidized to a very low point. When the bath reaches a higher temperature, the carbon begins to oxidize to a carbon monoxide. The escaping bubbles of carbon monoxide gas, which cause the boil, float out inclusions and flush out other gases. As heat is absorbed, this reaction proceeds until the diminishing carbon approaches equilibrium with the diminishing iron oxide at the prevailing temperature. It was pointed out that commercial melting practice includes wide variations in the length and violence of the boil as well as in the carbon drop and the lowest carbon content and that considerable dispute has arisen on the subject of the requirements for an adequate boil.

After the boil, the second phase designated by Carter and Donoho as recarburization and deoxidizing begins. The carbon must be adjusted by the addition of recarburizers and the dissolved oxide activity considerably reduced in order that the metal casting will solidify without gas cavities. Carbon additions eliminate some iron oxide in the form of carbon monoxide gas; manganese reduces the active FeO concentration to a lower level as manganese oxide is precipitated, and silicon precipitates more oxide as silicon oxide.

Silicon is the strongest deoxidizer of the three because the silicon-FeO equilibrium constant permits the lowest FeO concentration in solution. These insoluble oxides remain dispersed and suspended in the molten metal until they can fuse together or grow by reaction to a dimension with sufficient buoyancy to float out of the metal and fuse into the slag. This initial deoxidation has an important bearing on the general quality of the steel produced, particularly as regards the appearance of inclusions.

Third phase of the process, designated as slag control, really begins with the melt down, but most of the final adjustment is concurrent with the recarburization and deoxidizing period. It was pointed out that reasonable slag fluidity is desirable for the sake of steady efficient arcing and convenience in handling; in addition, a fluid slag absorbs more readily the nonmetallic inclusions floated out of the bath. Also of significance is the fact that the higher the FeO content of the slag, the greater its fluidity. Consequently, slag fluidity in the acid furnace is an indication of iron oxide content of the slag.

Most acid practices use only a single slag. With sufficient skill, time, and heat capacity the original slag can be "shaped" to almost any desired final composition and consistency. But where a final slag extremely low in FeO is desired, it is usually easier to drain off the original oxidizing slag and add a second synthetic slag of sand, lime and/or manganese dioxide in any desired proportions. Such a double slag method has some advantages of uniformity which can be used to obtain closer chemical control of certain unusual alloy steels.

Last phase is classified as final deoxidation and is usually carried out in the tapping ladle. In green sand castings the gas pressure from the mold supplements the gas evolved from the metal and makes it difficult to obtain castings free of gas cavities without the addition of some element that decreases the FeO to a much lower activity than does manganese or silicon. According to Carter and Donoho, aluminum has proved the most effective in this respect but its use requires careful control in order to avoid too much sacrifice of ductility. Primary purpose of adding aluminum in acid electric steel is the prevention of pin holes in green sand castings. The most used addition as a final deoxidizer is 2 to 2½ lb per ton of metallic aluminum. With about 0.02 per cent or more of residual metallic aluminum in the steel, pin-holes are effectively prevented. Fig. 1 shows the effect of residual aluminum content on 0.5 per cent carbon steel cast in 5 per cent moist sand. In Fig. 2 is shown the effect of chromium content on soundness of medium carbon steel cast in 5 per cent moist sand.

Silicon Carbide as a Deoxidizing Agent: Results of research carried on at Mellon Institute, Pittsburgh, on the use of silicon carbide in basic electric procedures for high quality alloy steels was reported in a paper by E. A. Loria, H. D. Shephard and A. P. Thompson. Data presented showed that the presence of granular silicon carbide in the slag during the finishing period is desirable because it affects the reduction of metallic oxides in the slag and the desulphurization of the bath. It was reported by the authors that silicon carbide is appropriate for such applications because where it is added in conjunction with lime and fluorspar it will provide essentially the same ingredients as arise from the inter-reactions between the commonly used coke, lime and ferrosilicon.

Some of the advantages cited for the use of silicon carbide as a deoxidizing agent were as follows:

(1) In contrast with the furnace-made calcium carbide slag, silicon carbide is ready to undergo reaction as soon as it is added with the lime and fluorspar. It was reported that a completely shaped up slag was obtained in 10 min compared with 25 min for the usual calcium carbide slag. Because of the initial reducing atmosphere that occurs with the silicon carbide addition, it was reported that many operators were able to save from 15 to 45 min furnace time

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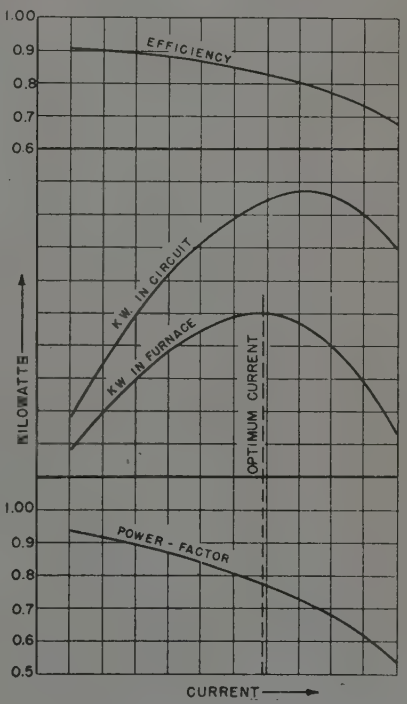

Fig. 3 (above)—Characteristics of three-phase arc furnace circuit

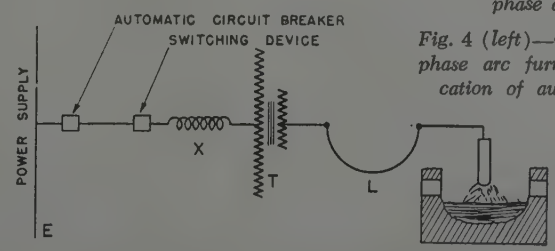

Fig. 4 (left)—One-line diagram of three-phase arc furnace circuit, showing location of automatic circuit breaker

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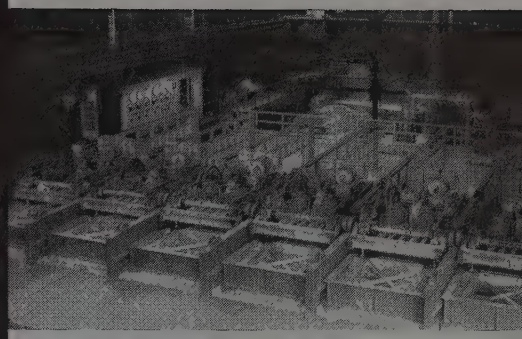

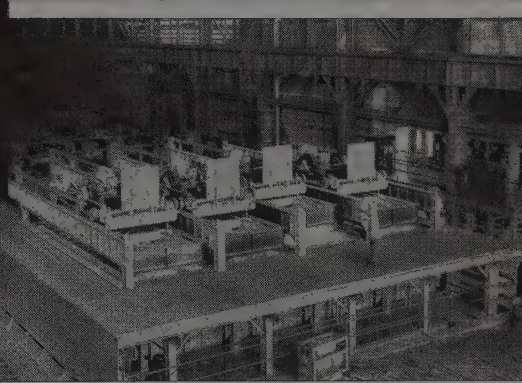

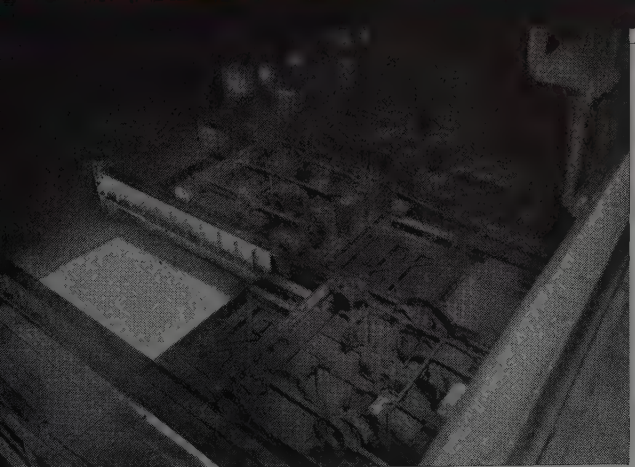

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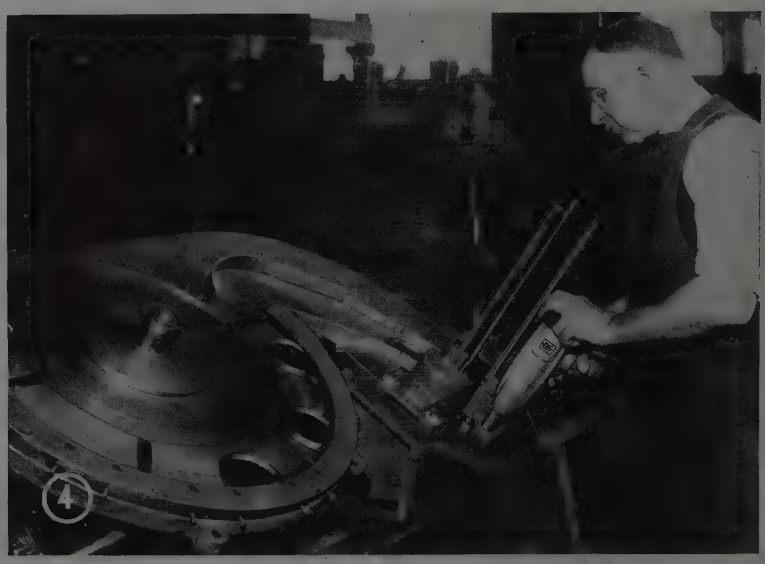
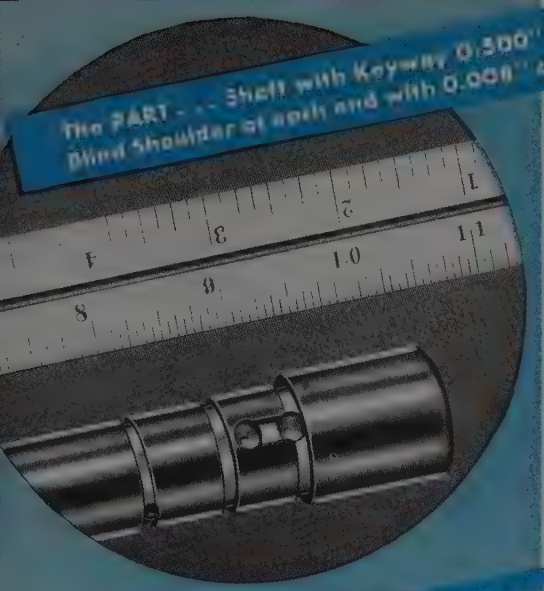
An advantage of the development, the company reports, is that the spindle of the 6½-lb tool may be stalled completely while the motor continues to run—with no danger of motor burn-out caused by the overloading. Another is that the impact mechanism eliminates torque reaction to the operator when the tool is used in running nuts, as illustrated in Fig. 4. It employs a reversible, 3 amp electric motor which operates on 110 v ac-dc.

Among the many typical operations which the 4U tool is capable of handling are such jobs as reaming a ⅜-in. hole in an oil filler spout, shown in Fig. 3. According to the manufacturer, it also reams holes up to ½-in. diameter. Although rated for ¼-in. drilling, it provides ½-in. holes by step drilling in ⅛-in. steps. The tool also taps holes up to ½-in., and can be used for wire brushing applications as shown in Fig. 1. In addition, it drives hole saws up to 1½-in. diameter in sheet metal.





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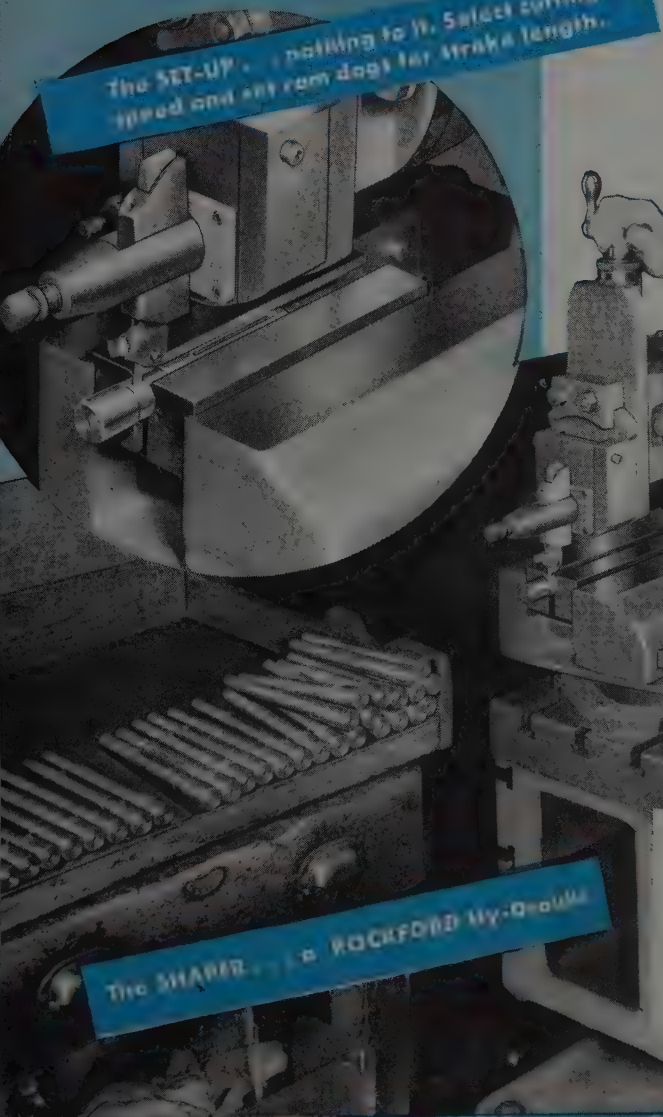

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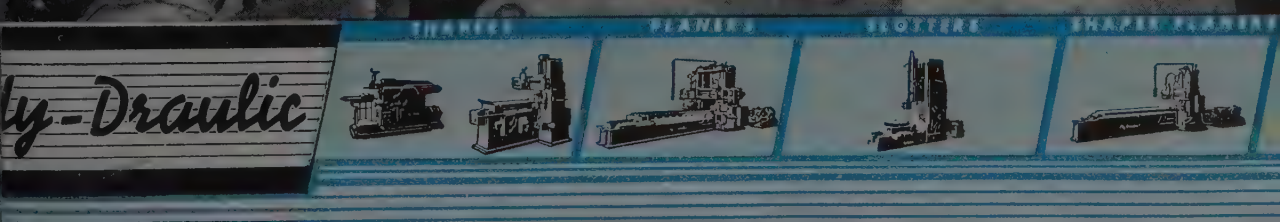
Ram type Shapers are built in 12″, 16″, 20″, 24″ special, 24″, and 28″ sizes . . . Openside Shaper in 36″ size. Available with all accessory equipment where it applies, such as universal table and power down feed.



By L. B. JOHNSON
Manager, Service Department
Oakite Products Inc.
New York

USE OF Soluble Oil Coolants

. . . in various machining operations on ferrous and nonferrous material. Data and formulas given here are based on current use in large and small plants and on a wide range of work

WHILE there are many different soluble oils formulated with various characteristics, the reference data in this article deal with a special type of soluble oil made from a highly refined paraffin crude. Its emulsifying base includes a specially prepared petroleum sulphonate along with other essential constituents which permit it to be completely and readily dispersed in water to form uniform, stable and well-balanced emulsions.

Besides being chemically neutral and possessing other properties which enable it to offer high resistance to rancidity, this soluble oil has the desirable feature of an exceptionally wide range of dilution. Concerning this latter feature, it will be noted in many formulas given later, these representing average experience of many plants, that the properties of this special type soluble oil permit dilution ratios that normally exceed those on certain types of work. Obviously in each case, the coolant should be custom-fitted to each machining operation for best results and economy.

To meet unusual and special machining conditions on different types of work, several Oakite materials find a beneficial and successful use as addition agents to soluble oil in making up solutions and emulsions for machining. These addition agents—Oakite, stamping and cutting paste, special drawing compound, renovator and other Oakite materials—help to produce certain advantages and effects such as (1) providing a rust-preventive coating or film on work; (2) aiding resistance to gumming; (3) improving machinability and surface finish; (4) amplifying stability of emulsion to counteract the effect of any residual acid on bar stock or work after pickling and which might tend to acidify emulsion; (5) helping keep piping, tanks and pumps in clean condition.

Oakite, the first-mentioned addition agent, is generally employed in most all formulas, ¼ to ½-oz to each gallon of water. It should always be added to water first, before adding soluble oil to water. Stamping and cutting paste and special drawing compound are water-soluble addition agents of a more heavily compounded nature. Either is miscible with water or oil. They provide extra lubricity, cushioning and other properties that result in further improvements in finishes and longer tool life on certain machining operations.

Owing to the widely varying conditions in shops, materials to be cut and operations to be performed, it is obviously not practical to attempt any standardization of specific soluble oil dilution ratios for specific operations. Actual experience of users, however, provides a guide for others in adapting soluble oil to the same or similar work since much depends on metals, cuts, speeds and other factors. Accordingly, only general recommendations for using soluble oil will be given which may be employed as starting points in determining the most advantageous dilution ratios for specific operations.

In making up dilutions of soluble oil the first consideration is whether the operation will make light or heavy demands upon the cutting emulsion either from the standpoint of cooling or lubrication, or both. In many cases, by incorporating the recommended addition agents to the cutting fluid emulsion, certain advantages result that are not obtainable when emulsions are used straight, particularly in areas where water is very hard or is slightly acid.

If a straight oil is to be replaced with a soluble oil cutting emulsion on a certain operation it is often advisable to use a higher top rake angle on cutting tool. It aids in reducing chip pressure and coolant emulsion has more opportunity to carry off heat from the area of cutting action.

Studies conducted by many authorities and research organizations corroborate the company's experience regarding contamination of cutting fluids by bacteria. Accordingly, if bacterial contamination of new coolant emulsion is to be avoided, be sure first to clean tanks on machines before charging them with soluble oil coolant emulsion. Use an alkaline solution, preferably hot, circulating solution with pump on machine. Then flush with clear water. Or if a main supply recirculating system is employed, pump hot cleaning solution through entire system. The objective is to remove all fouling matter, gummy residues and bacteria-harboring sludge and slime that have previously built up in tanks, lines, pumps, strainers and filters.

Too much emphasis cannot be placed on the importance of thoroughly cleaning out tank on machine, and tank and lines of recirculating system delivering a coolant emulsion to a battery of machines. Bacterial contamination of any cutting solutions is attributable to many factors. Probable causes are water characteristics, contaminating dirt, oil and grease on work, air-borne bacteria, uncleanliness of workers' hands, extraneous matter getting into tanks, inadequacies of plant sanitation. Unless preventive measures are taken to control or prevent bacterial growth, solutions may become rancid and give off foul odors. When this occurs solution must be discarded.

It is therefore good practice periodically to clean out tanks, strainers and lines and follow with germicidal treatment to destroy bacteria. Various materials are available for this purpose.

When making up soluble oil in the dilution ratio suggested for a particular operation, care should be taken to: (1) Correctly measure oil and water in the right proportion; (2) always add oil to water and not water to oil; (3) keep coolant solutions slightly alkaline. By adding the soluble oil to water, a coolant emulsion is formed consisting of minute globules of oil, each globule surrounded by a droplet of water. As evaporation takes place either on work or machine, a thin film of oil remains on surface that helps resist possible rusting.

On the other hand, if water is added to oil, an inverted or reverse emulsion is likely to result (droplets of water surrounded by oil) which usually does not perform efficiently and often is the source of trouble—rusting of work surfaces and separation of solution. As previously mentioned, coolant solution should be maintained slightly alkaline by adding ¼ to ½ oz Oakite to each gallon of water before adding the soluble oil. In addition to maintaining slight alkalinity, Oakite

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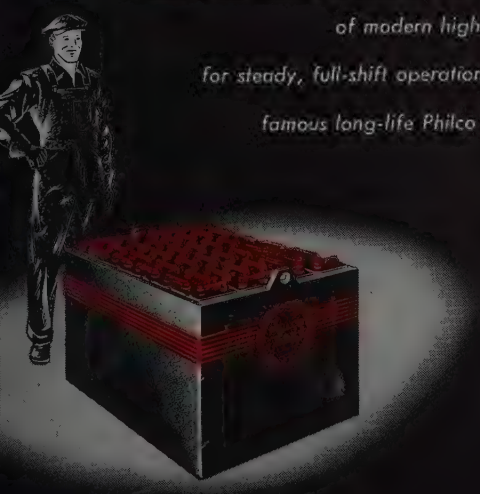

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TABLE I
MACHINING STEEL

Drilling, Reaming: Formula No. 1—1 gal soluble oil, 10 to 20 gal water, ¼ to ½ oz of Oakite to each gallon of water.
Formula No. 2—1 gal soluble oil, 1 to 2 lb stamping and cutting paste, 5 to 15 gal water, ¼ to ½ oz Oakite to each gallon of water.
Formula No. 3—1 gal soluble oil, ½ to 1 lb special drawing compound, 5 to 10 gal water, and ¼ to ½ oz Oakite to each gallon of water.

Milling: Formula No. 1—1 gal soluble oil, 10 to 15 gal water, and ¼ to ½ oz Oakite to each gallon of water.
Formula No. 2—1 gal soluble oil, 1 to 3 lb stamping and cutting paste, 5 to 10 gal water, and ¼ oz Oakite to each gallon of water.
Formula No. 3—1 gal soluble oil, 3 to 9 lb special drawing compound, 10 to 20 gal water, and ¼ oz Oakite to each gallon of water.

Threading, Tapping (Light): Formula 1—1 gal soluble oil, 10 to 15 gal water, and ¼ to 1/3 oz Oakite to each gallon of water.
Formula No. 2—1 gal soluble oil, 1 to 5 lb stamping and cutting paste,* 5 to 10 gal water, and ¼ oz Oakite to each gallon of water.
* Depending on requirements, special drawing compound may be used in formula No. 2 instead of stamping and cutting paste.

Turning, Boring, (Lathes): Formula No. 1—1 gal soluble oil, 10 to 30 gal water, and ¼ to ½ oz Oakite to each gallon of water.
Formula No. 2—1 gal soluble oil, 2 to 6 lb stamping and cutting paste, 3 to 15 gal water, and ¼ to ½ oz Oakite to each gallon of water.
Formula No. 3—1 gal soluble oil, 2 to 3 lb special drawing compound, 5 to 10 gal water, and ¼ to ½ oz Oakite to each gallon of water.

Cold Sawing:* Formula No. 1—1 gal soluble oil, 10 to 50 gal water, and ¼ to ½ oz Oakite to each gallon of water.
* Use also for abrasive cut-off wheel. Coolant emulsion has high cooling ability where heat dissipation factor is essential requirement. Many high speed sawing operations require more lubricity and a heavier body emulsion than indicated in formula above.

TABLE II
MACHINING BRASSES

Operations	Ratio of Soluble Oil and Water
Threading, tapping (light)	1–15
Drilling, reaming	1-25
Milling	1-25
Turning, Boring (Lathes)	1-25
Cold Sawing	1-30
Grinding	1-75

COPPER AND THE BRONZES (INCLUDING MANGANESE, PHOSPHOR, SILICON BRONZES AND CUPRO-NICKEL ALLOYS)

Drilling	1-15
Turning, Boring	1-15
Milling	1-15
Sawing	1-20
Grinding	1-75

Note 1. On copper and bronze alloys, soluble oil is not in general recommended for reaming, tapping and most screw machine operations.
Note 2: In making up soluble oil coolant emulsions for machining brass, copper and bronze, the addition of ⅛ oz to ¼-oz Oakite to each gallon of water tends to soften water and keep coolant emulsion on alkaline side.

TABLE III
MACHINING ALUMINUM

Turning: Formula No. 1—1 gal soluble oil, 5 to 20 gal water.
Formula No. 2—1 gal soluble oil, 1 to 3 gal renovator, 4 to 40 gal water.
Formula No. 3—1 gal soluble oil, 1 to 2 lb cutting and stamping paste, 3 to 5 gal water.

Drilling, Reaming: Formula No. 1—1 gal soluble oil, 1 to 3 gal renovator, 4 to 40 gal water.
Formula No. 2—1 gal soluble oil, 10 to 20 gal water.
Formula No. 3—1 lb special drawing compound, 1 gal renovator, 4 gal water.

Milling: Formula No. 1—1 gal soluble oil, 1 gal renovator, 10 to 30 gal water.
Formula No. 2—1 lb special drawing compound, 1 gal renovator, 4 to 6 gal water.

Threading, Tapping: Formula No. 1—1 gal soluble oil, 1 gal renovator, 5 to 20 gal water.
Formula No. 2—1 gal soluble oil, 1 to 3 lb stamping and cutting paste, 5 to 10 gal water.

Note 1: In areas where water is unusually hard, addition of ¼-oz Oakite to each gallon of water used, conditions and softens water so a good emulsion is formed.
Note 2: In the formula which includes cutting and stamping paste or special drawing compound, the "richness" of the cutting fluid emulsion desired is governed by the amount of these materials used in a given formula, and amount of water. In each case, simple tests permit adapting the formula to individual requirements of operation being performed.
Note 3: Where renovator is included in a formula, first mix soluble oil and water (adding oil to water) and then add renovator.

softens the water, reduces its surface tension and a better emulsion is obtained.

When adding soluble oil to the treated water, pour oil in slowly, stirring rather vigorously while pouring to disperse oil throughout solution. Good practice is first to thoroughly premix the determined amount of soluble oil in a smaller amount of water before adding it to total amount of water which is to be used.

Machining Ferrous Metals: As pointed out, one control factor of obvious importance that governs the proportions of soluble oil and water mixtures is the metal being machined. Ferrous metals vary widely in machinability properties. On free machining metals like the low carbon steels, coolant mixtures of low oil content are generally employed. Medium and high carbon steels require a coolant mixture of higher oil content and possibly the inclusion of the recommended addition agent to meet special conditions.

Ordinary cast iron has more often than not been machined dry, but developments in modern cast irons permit finer machined finishes and in most cases a soluble oil, with a low oil-to-water ratio may be advantageously used to dissipate heat generated in cutting. Experience indicates that on the basis of actual shop practice, determining the best dilution ratio for soluble oil used either alone or with an addition agent on a specific operation and metal, is usually a procedure requiring only simple testing to adapt it to the operation being performed.

Each of the formulas given for various operations, Table I, provides a range of dilution from which a starting point for actual trial determinations can easily be made. Where more viscous cutting solutions are required and extra lubricity is essential and desirable, addition agents such as stamping and cutting paste or special drawing compound, should be included in the formula in the range of suggested proportions. In addition to supplying extra lubricity, they help materially in extending tool life and in improving finish.

Where a soluble oil cutting fluid includes either stamping and cutting paste or special drawing compound, procedure in mixing should be as follows for best results: First add ¼ to ½ oz of Oakite for each gallon of water. Then add soluble oil, pouring in slowly, while stirring. This forms a milky, opaque emulsion.

In a separate container put the required amount of stamping and cutting paste. Then add Oakite-treated water, preferably warm or hot, in small amounts. Warm or hot water facilitates and speeds the mixing. When adding the water, stir or mechanically agitate until the mixture becomes a smooth, creamy emulsion. Then add this addition agent mixture to the soluble oil emulsion. The same procedure applied when using special drawing compound. In other words, always mix the soluble oil and water separately and the addition agents separately.

If, after a coolant emulsion mixture has been added to tank on machine, it becomes somewhat "rich" due to evaporation of water during machining, add water as required, and in which is included ¼ to ½ oz of Oakite to each gallon of water to maintain coolant emulsion on alkaline side. At all times provision should be made to insure a copious supply of cutting fluid to the tool and to the work.

Machining Nonferrous Metals: Of the nonferrous metals, those commonly encountered in machining operations are the copper alloys. Of the various classes of copper alloys, the brasses are more easily machined than copper itself or any of the various bronzes. Ease of machining these metals decreases in the following order: (1) The free-cutting brasses which have a content of some metallic element such as lead; (2) straight copper-zinc brasses; and (3) copper and the various bronzes, such as manganese bronze, phosphor bronze, aluminum bronze, etc. General recommendations for soluble oil when used as the cutting fluid in various machining operations on the copper alloys are shown in Table II.

In plain wet grinding, soluble oils are generally indicated. The dilution ratio varies since it will depend on metal, degree of cooling required and other controlling factors. The general formula given for using soluble oil in wet grinding operations provides a range of dilution from which a starting point formula may be determined that is best adapted to a particular metal and the individual requirements existing in a shop or plant. Formula No. 1—1 gal soluble oil, 20 to

(*Please turn to Page* 142)

English Foundry and Machine Shop Make

Functional Use Of Colors

FOR some years British industrial psychologists have urged the importance of some substantial improvement in the aesthetic quality of the interiors of factories given over to heavy industries. They have held out a reward not only of better visibility by night as well as by day but, as a result of the psychological effect upon workers of brighter and more congenial surroundings, a higher production of first-class work and a lessening of the work accidents incidence.

Some industrialists have tackled the subject, but in most cases without a marked degree of enthusiasm, confining their schemes of color treatment to walls or machinery and neglecting to embrace the workshop as a whole, probably because, in the absence of reliable experience, the very heavy expenditure and temporary disruption of production occasioned by the progress of the work may not have appeared justifiable.

Observation of the immediate effects of a planned color scheme recently completed at the main engineering works of David Brown & Sons Ltd. at Huddersfield, Yorkshire, and the foundry of P. R. Jackson & Co. Ltd., of Manchester, one of the eight companies within the David Brown organization, is interesting. The scheme was worked out in a three-cornered consultation of engineers, psychologists and paint specialists and, because of the intricacy of the actual work, the Park works, Huddersfield, scheme has taken 12 months to complete.

David Brown & Sons are the largest manufacturers of gears in Europe. Park works is a modern factory covering 11 acres and free from the evils of faulty development, varying levels and the bad natural lighting still to be found in the industry. For this reason, it would appear that the degree of improvement likely to be effected would not be commensurate with the heavy cost involved. In fact, when the paint contractors first went into the shops the workers almost resented their presence.

The considerations of the scheme were: (1) Elimination of the drab appearance of machines by enameling them in light hues; (2) prevention of eye strain by provision of light-reflecting colors on walls, ceilings and fixtures; (3) establishment of a more cheerful atmosphere by the blending of these colors in harmony; (4) improvement of visibility; and (5) by relieving the monotony of drab colors and whitewashed walls to reduce accident proneness and to increase production—to provide physical, mental and social advantages.

Walls, ceilings, stanchions and overhead cranes are painted "semialert" cream with, on occasion, a dado of reseda green to reduce distance. Machines are enameled cream and green with "alert" orange on operational points, and service boxes and casings for power, water and compressed air stand out in orange. In the forges and foundries the predominant hues are yellow, green and aluminum.

Effect on "seeing" conditions, as di tinct from the actual intensity of illum nation, is marked, and the appearance the shops is immeasurably brighter ar more cheerful. White lines on the sho floors to demarcate aisles assume a ne importance and are well defined ar somewhat broader for added decorati interest. The accompanying photograp shows a newly painted machine ba the light reflecting qualities of the pai being clearly shown.

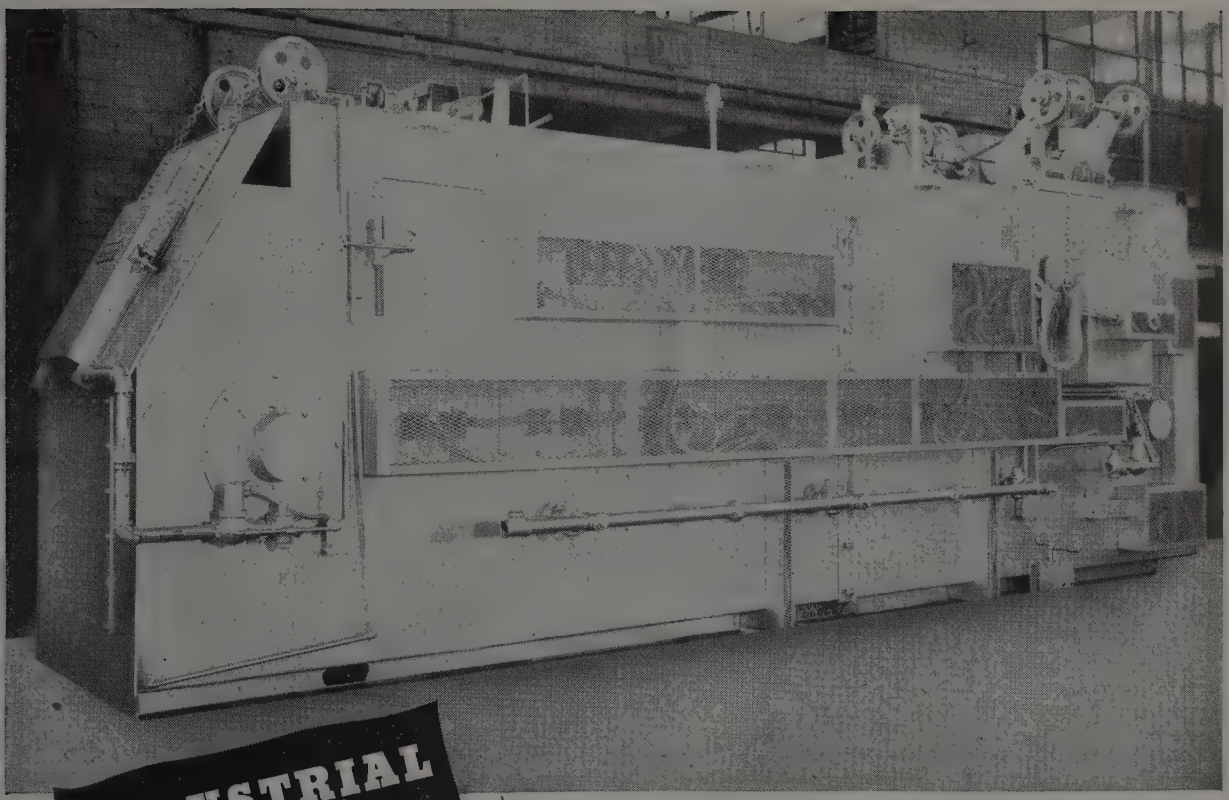
Plant maintenance crews have alread benefited by the decorator's art, for th operator takes a renewed pride in h machines and in his care of the enamele finish includes a fresh consideration f the working parts.

A. W. Garrett, chief inspector of fa tories, in a commendation of factory dec ration stated that it has been establishe that nearly all work rooms can be give internal color decoration on walls ar machines in a way that will provide ae thetic satisfaction and mental invigor tion, realized or unrealized, to the pe sons there at work. It is not merely matter of dashing on bright colors random: Different persons react diffe ently to different colors, and varying sit ations call each for their proper trea ment. There is evidence that the d mand for color on the part of worke and employers alike is fast growing something that may be described as national significance. Workers spen most of their active lives in the factor and the reasonable amenities of civilize home life—light, air, physical comfo social intercourse, color—all have b come not possibilities but accepted pra ticalities in our works.

The painter's work in the P. R. Jac son foundry presented considerable diff culty. The foundry, one of the olde in the country, was established well ov a century ago and, because of the natu of the work carried on there, the buil ing appeared incapable of taking a glo paint, but the job is being done ar should help a great deal in the recrui ment of labor to the founding industry

Broadly, the color scheme depends a light stone color arrested by contra with implement blue on dados, the in pression of freedom being enhanced b white ceilings. Doors, windows, hoppe clothes lockers and small overhead cran are finished in deep red and the lar overhead cranes in a light stone col with working parts picked out in orang All these paints are high gloss.

Aluminum is used for mold dryi and storage racks, storage hoppers, blas ing booth, etc., and flat battleship gr for booth interiors. Furnaces, canopie trunking and dust extraction plant a also painted in aluminum, which wit stands heat excellently, and sand drie mixers and drilling machines in oil-resis ing implement blue.



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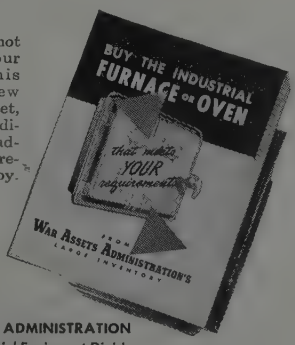

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Milling

(*Concluded from Page* 92)

introduction of high speed steel about 50 years ago. It got its big impetus, however, when A. L. De Leeuw and certain other tool engineers who applied scientific methods to cutter design, substituted strong, coarse tooth cutters for the frail, fine tooth variety previously used.

These removed immeasurably more metal, but to do so they required greatly increased power on both table and spindle. That meant more weight and rigidity and it sounded the death knell of the long-familiar cone pulley, flat belt drives. Geared heads had to be substituted, and high quality steel gearing had to be used.

This big shake-up in milling machine design due to high speed steel and coarse tooth cutters of that material, reached its climax after the first World War. One of its important manifestations was the general adoption of a new type of standardized spindle nose and draw back mechanism which gave the strength, holding and driving ability demanded by the heavy duty cutters. This was one of the first major instances of major inter-company standardization in the machine tool industry. The National Machine Tool Builders' Association deserves great credit for it, as has been true of other similar projects since carried through or now pending.

New Methods Inspire Changes

We are now in the midst of another big shake up in milling machine design —this one due to the introduction of carbide cutting materials and the development during the war of extremely coarse tooth cutters—some with only one or two teeth. The first rumblings of this current revolution began in some of the west coast aircraft plants during the recent war, when it was discovered that coarse tooth carbide milling cutters could be run on aluminum and magnesium at speeds and feeds comparable to woodworking.

Then, when steel work clamps accidentally got in the way of these fast cutters, it was discovered that steel and iron—under proper working conditions—could be milled at almost equally sensational speeds and feeds. One of the requirements was that the action of the cutters be stabilized. This led to the use of heavy flywheels on the cutter arbors.

Inasmuch as this technique was of major importance to the war production effort, it was broadcast to American industry through illustrated data sheets sponsored by the War Production Board and the Production Engineering Committee of the American Society of Mechanical Engineers. At the same time research programs were launched by the University of Michigan, California Institute of Technology, and various cutter and milling machine manufacturers. At no time in history was any phase of the "revolution in machine shop practice" ever pushed with such vigor as this.

On the two-page spread at the beginning of this article, I have illustrated two examples of high velocity milling of light metal. The photograph at the head of the story shows a Milwaukee vertical spindle miller with revolving table machining an aluminum casing. The "flywheel effect" in this case is developed in the cutter body itself, which is excellent practice where possible.

Flywheel Effect in Flanges

Another and more elaborately tooled example is shown on the right hand page of the spread. This setup for cutting the cooling fins in the dome of a Wright Cyclone forged cylinder head is in a Cincinnati Hydromatic milling machine. The double cutter is 13 in. in diameter to develop high peripheral speed. Its carbide teeth are carefully honed and the heavy flanges give combined flywheel and vibration-damping effect. It operates at 4500 surface feet per minute at feed of 70 in. per minute and its cut is 2¾ in. deep.

The tracer mechanism setup in this case consists of a disk of the same diameter as the cutter. This rolls off a shelf to bring the cutter to depth, then rolls around on a drum as the dome revolves in a corresponding manner. This drum is the counterpart of the bottom of the cut in the dome. This machine and setup are typical of the possibilities of tracer controlled manufacturing milling.

Another example of the application of milling to reproduction of intricate shapes is given by the photograph at the lower left hand corner of the two-page spread. This, however, is a tool room rather than a production operation, involving as it does the cutting of a medallion die from an enlarged master by means of a Gorton pantograph machine. As the tracer is passed over the contours of the model or former, the high speed end mill goes through the same motions on a reduced scale—thus cutting the die block. This is the basic principle underlying big die milling machines, although electromagnetic or servo-controlled hydraulic "feelers" eliminate the human element in those machines.

Getting back to the subject of ultra-speed production milling, the wartime expedients of "suping up" standard milling machines of 1935 vintage with bigger motors, flywheels and big diameter cutters was a necessary war measure but it took heavy toll of those older machines and is not the kind of thing that profitably can be continued in the postwar era. Realizing this, leading milling machine builders already have introduced new machines with two or three times the power of previous models; built-in flywheels, high spindle speeds which will eliminate need for oversize cutters, cutting feeds which are even faster than "quick return" previously used, heavy frames to resist the heavy stresses, and in many instances provisions to allow "climb milling" as well as conventional "upward cutting."

Successful climb milling—that is, revolving the cutter down on the workpiece—calls for absolute rigidity of work and tools and complete lack of backlash in the feed works. If attempted on machines without backlash eliminators, a grand smash up is apt to result. Under proper conditions, however, it is a highly efficient method of cutting, as was demonstrated by Charles DeVleig at least as long ago as 1930.

While sensationally fast milling cuts have their place in mass production operations and are destined to do a lot toward keeping down costs of automobiles, etc., there still is plenty of room in industry for common sense use of standard milling cutters operating at normal speeds. A good example of such work is given in the small cut at the center of the two page spread at the beginning of this article.

Multiple Cuts Save Time

This shows a typical setup for milling high carbon steel V-blocks in a No. 12 Brown & Sharpe plain milling machine. At 75 rpm with 2 in. per minute feed, about 17 blocks per hour are turned out. Instead of getting results through excessive cutting rates, the effort here has been to arrange cutters and work so that a maximum number of things happen all at one time.

Having gone once over very lightly this big subject of milling, I venture to predict in closing that there is destined to be increasing use of two types. One is the simple hand miller, which with modern cutters, modern fixtures and modern attachments is a highly effective machine on small, relatively simple parts. In the hands of those who get a bonus for maximum output, or who are on piece work, it will perform miracles. It is a far cry from the old "keyway millers" to the latest and best hand millers. Like light duty drill presses, they are not to be sneezed at as modern machine tools.

At the other end of the scale are the automatic and station-type milling machines which will take in a rough casting, forging or pressing at one end and eject a finished part at the other end.

James Y. Scott, president of the Van Norman Co., believes that "we haven't seen anything yet" in that direction. He believes that in the battle with rising costs of the human factor in manufacturing, "process machines" of that character are destined not only to mill and otherwise rough and finish machine parts but also to carry out assembly of these parts with other mating parts.

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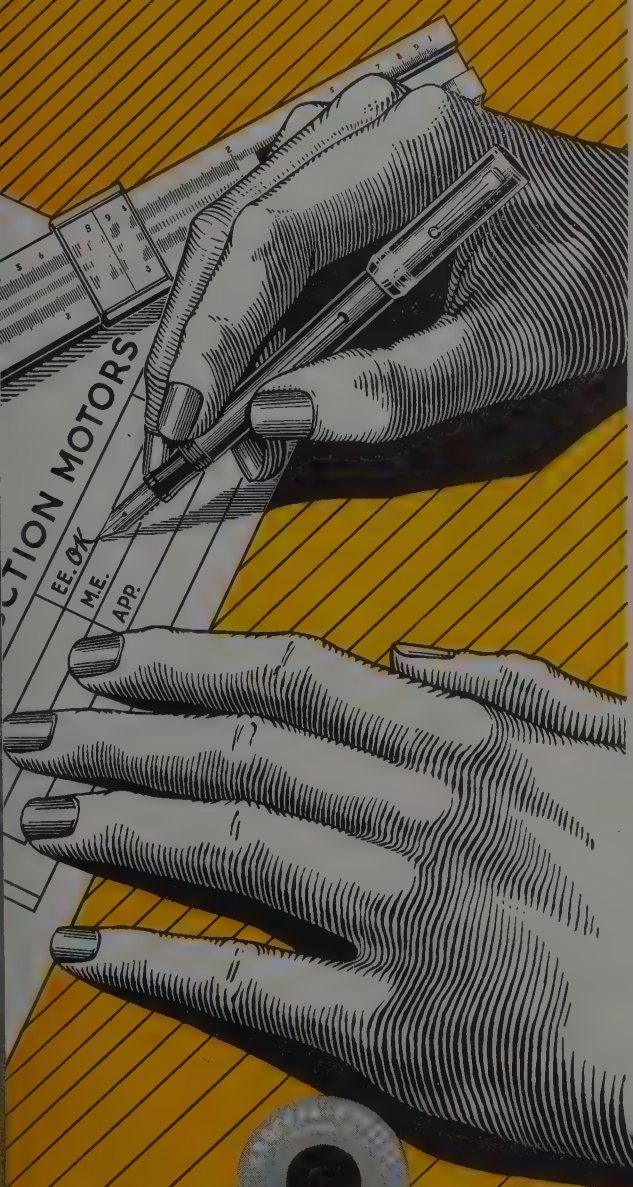

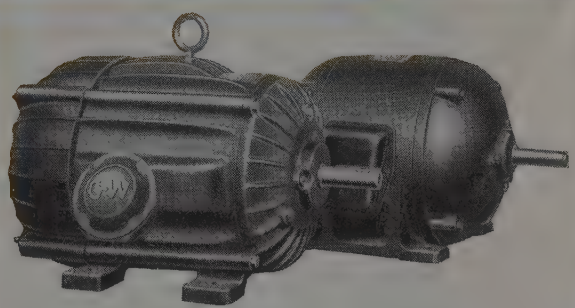

Crocker-Wheeler know-how, acquired through 60 years of manufacturing quality electric motors and generators, has broadened its horizons. A new ownership and management assumed control of this pioneer company during the war. This new management has developed Crocker-Wheeler's production and research facilities to match the recognized superior quality of its products.

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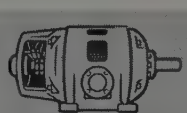
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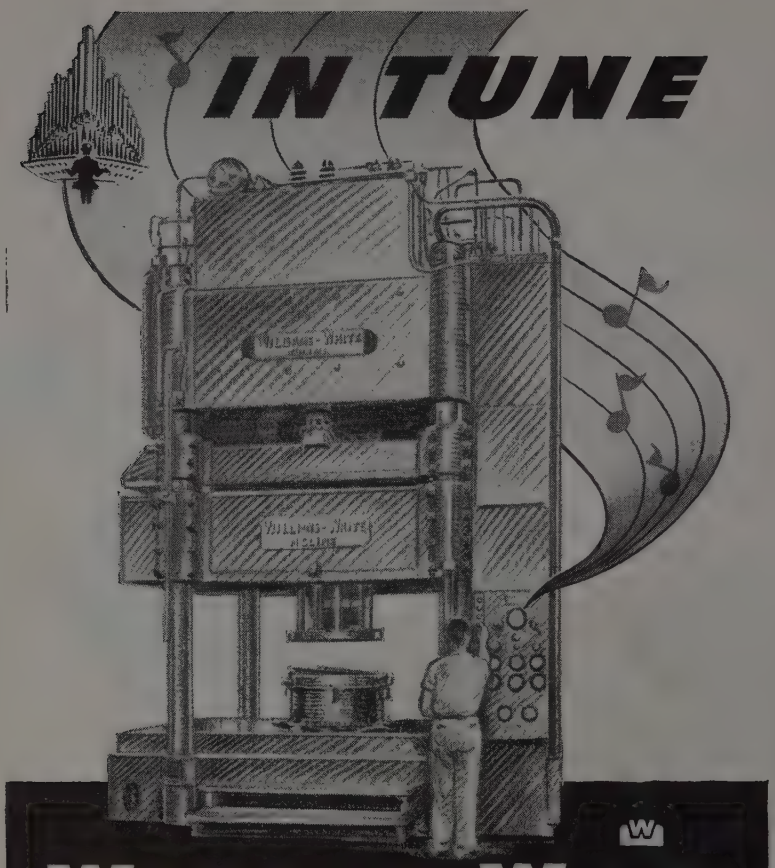

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Gas Chemistry

(*Continued from Page* 88)

carburized and cooled slowly. Formerly it was expected that such parts would lose some carbon from the surfaces during reheating, and allowances were made for grinding subsequent to hardening. It is now an established practice in the automotive field to machine these parts completely by precise gear-shaving processes prior to any heat treatment. Thereafter they may be carburized, reheated, quenched and drawn and put into use with no further operation other than possibly a light cleaning by shot blast.

The obvious implication is that such treatment affords wide opportunities in the manufacture of small gears and other parts for automobiles, machine tools, etc. The types of furnaces suitable for such applications are available and the kind and methods of control of the necessary atmospheres to surround them during the heat-treating cycle are now known.

Controlling Carbon Concentration

Precise control of carbon-bearing gases for heat treating operations also extends into the carburizing field. It is now well established that control of carbon concentration in the outer portions of the carburized case is very important from the standpoint of physical characteristics of the carburized part. The amount of carbon desired may vary from as low as 0.75 per cent to as high as 1.3 per cent depending upon the use for which the part is made. This is a new concept of carburizing quality; it can be controlled in all ranges by gas carburizing.

It is not an accident that gas is so satisfactory in cases where surface conditions must be controlled with the nicety described above. Control is the result of years of effort in developing tight furnaces and complex gas atmospheres. It has been found that atmospheres containing the usual mixture of carbon monoxide, carbon dioxide, methane, hydrogen, nitrogen and water vapor can be used with a complete knowledge of the carburizing, decarburizing, oxidizing or reducing action by the simple expedient of checking the dew point of the gas.

Closely akin to gas carburizing is the dry cyaniding process. Entirely a gaseous process in batch or continuous furnaces, the quenched product is substantially the same as is now obtained from salt bath treatment. The process also can produce file hard surfaces by slow cooling, Fig. 6. This is an important consideration where distortion is a problem. Manufacturers of small parts such as thrust washers, speedometer gears, typewriter and adding machine parts have indicated considerable interest in the slow cool dry-cyaniding process.

In the nonferrous field, heating usually

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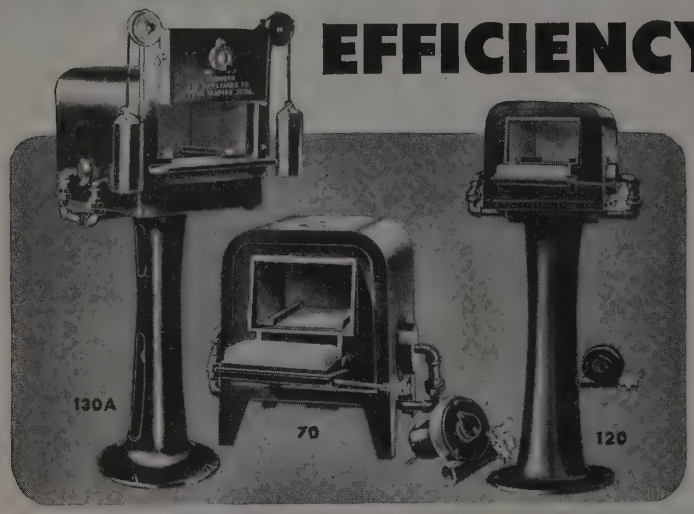

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is for one purpose only and that is to produce a desired degree of softness in the metal. There are no problems involving carbon control, consequently the choice of atmosphere is much more simple than in the case of ferrous metals. No less important however is the degree of control which must be exercised to maintain the required furnace atmosphere. Gas must supply this atmosphere.

The bright annealing of copper in all its forms has long been successfully practiced under a number of conditions varying from use of flue gas atmosphere to atmospheres consisting entirely of steam. Certain alloys of copper such as the brasses and the bronzes were handled in adaptations of these atmospheres, Fig. 7. More recently there are indications of considerable pressure on the part of the brass and bronze industries to improve atmospheres for handling their products. To date the most promising method for minimizing surface defects during heating is the use of a nitrogen atmosphere with carefully controlled water vapor content. As the demand for further improvement continues the gas industry must supply the necessary atmospheres, whatever those atmospheres may be.

Bright Annealing Problem

In yet another nonferrous industry namely precious metals, the bright annealing problem is paramount. These alloys of gold and silver containing varying amounts of elements such as zinc, copper, nickel, etc., are annealed at temperatures varying from about 900° F to as high as 1300° F. The gas furnace manufacturers provide the equipment and technical knowledge necessary to meet the expected increasing demands from this particular field.

Thus far we have considered only those applications which by their very nature are dependent upon gas for atmosphere purposes and consequently should give gas the preference for heating. However, the metal industries are not confining their interest in the use of gas as a fuel to this type of equipment. There are numerous applications of rapid heating for forging. Properly designed gas fired equipment can now uniformly raise the temperature of a 4-in. square steel billet from room temperature to forging temperature in 12 min. Copper and brass strip can be annealed in a matter of seconds while moving past a few gas burners set to deliver a maximum output of heat in a minimum of space.

The various processes discussed herein are actually the result of many years of research and development. The war need for greater production with increased

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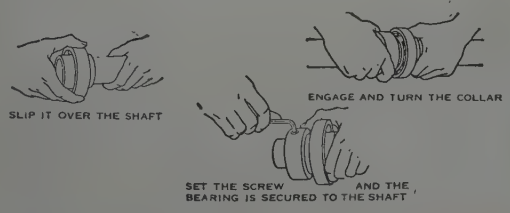

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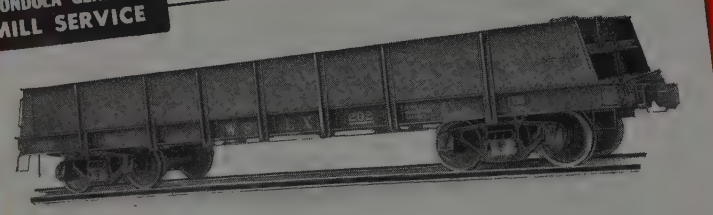
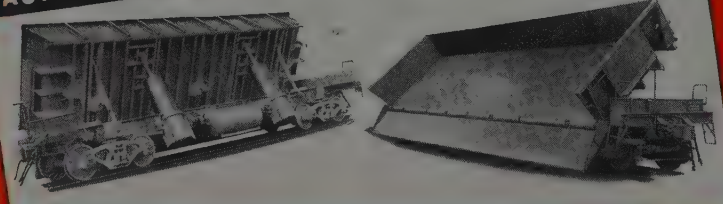


AIR DUMP AUTOMATIC



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economy and quality called attention to them. As a result gas became an important heat treating tool in the hands of many men who previously had had little more than a passing acquaintance with its use. In future years and especially as still greater heat treating uses for gas come out of the laboratory the demand for it will continue to increase.

Fabricating Aluminum

(*Concluded from Page* 93)

Aluminum can be riveted in same manner as black and galvanized sheet. In fact riveting is the most widely used method of joining aluminum sheet for aircraft work. Self-tapping sheet metal screws are not recommended for use in aluminum for duct work—they tend to loosen up because these alloys work so easily. Aluminum can also be welded readily by conventional gas, arc and spot welding methods. Soldering of this metal is not as well standardized as other methods of joining and is recommended only where the joint is to carry little or no mechanical stress, because soldered joints have low strength. In any case, it is of the utmost importance to employ a solder and flux especially designed for aluminum. Brazing is increasing in importance as a joining method for aluminum but finds very limited use in duct work.

Light Weight Important

Light weight of the metal is important in erection since it permits one or two men to handle the largest size ducts. On a recent large air-conditioning job for a theater, three men handled the erection of a large 60-foot vertical aluminum stack. The job was assembled on the ground in two sections, and raised into position after assembly.

It is evident that assembling the stack on the ground and then raising it into position is a much faster method. In a similar manner, use of aluminum allows the assembly of all types of large and complicated duct work on the ground because the weight is still low enough to permit the assembly to be placed in position without difficulty.

Film Traces Aluminum from Ore to Finished Metal

Production of aluminum from raw ore to finished materials is described in the Bureau of Mines film "This is Aluminum" recently made available for showings to industrial and vocational training groups, business clubs, schools, etc. The 16 mm sound film has a running time of 30 min. Application for loan of the film should be made to Graphic Services Section, Bureau of Mines Experiment Station, Pittsburgh 13.

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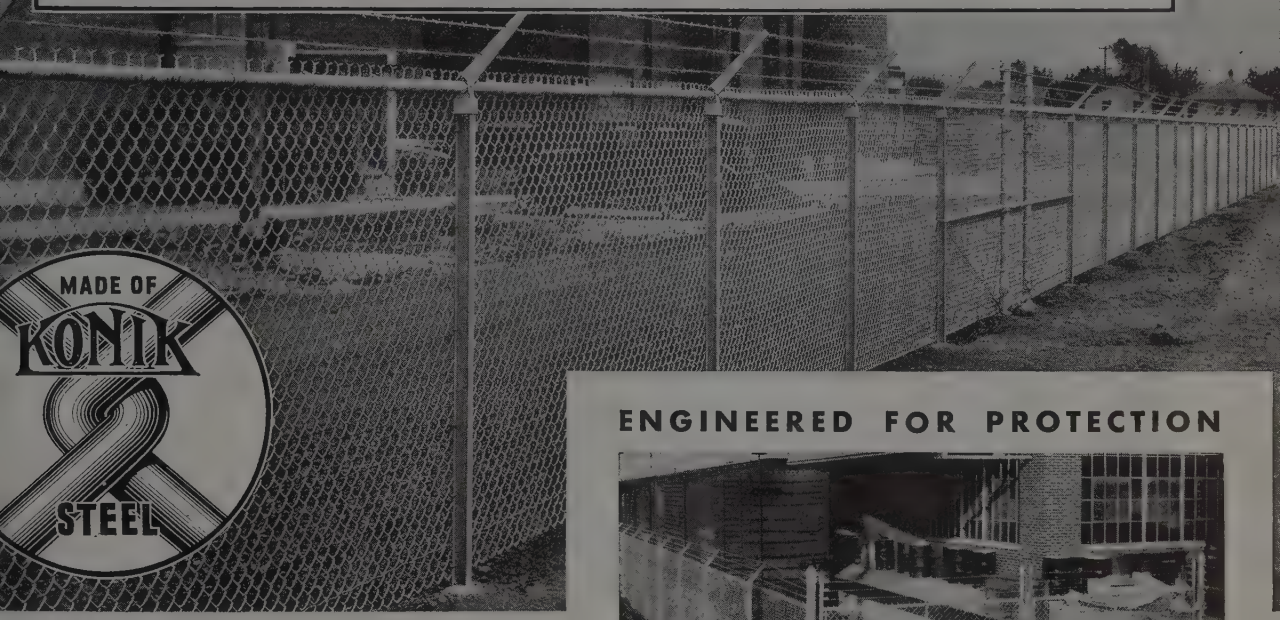

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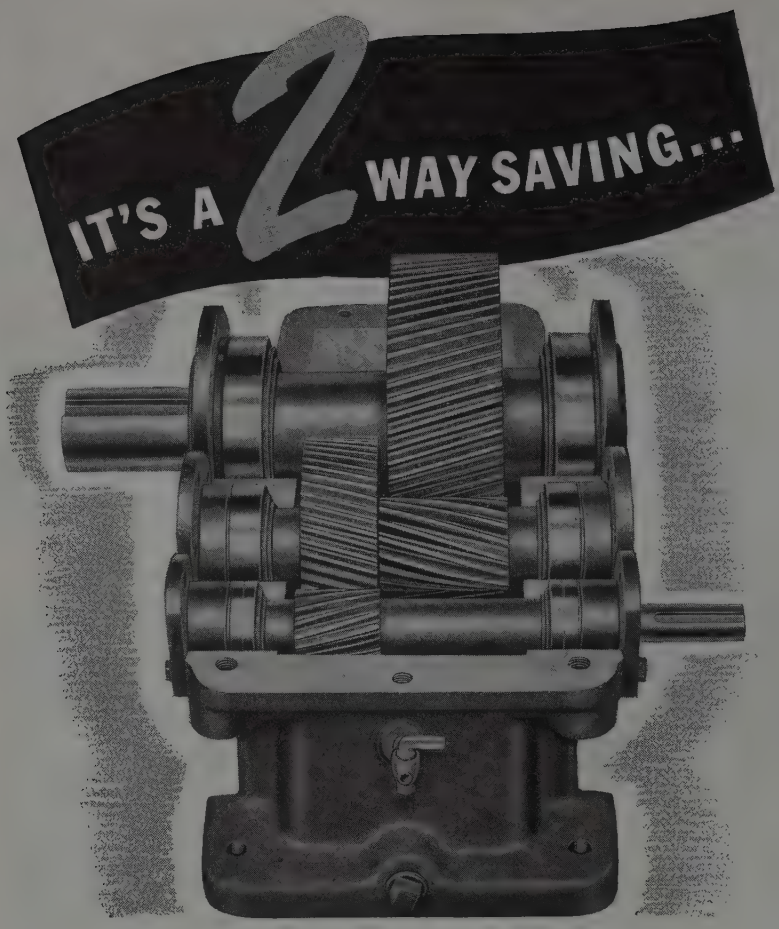

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Quality Control

(*Continued from Page* 89)

vendors of the product.

Quality control is extremely important as a means both of improving the average quality level of a product and of improving the uniformity within a product. Frequently it determines whether a product can be produced and distributed at a profit. It is one of those intangibles that helps determine the difference between unsuccessful operations and those that survive through the elimination or the reduction of scrap, rework, customer returns and other costly factors.

In order to illustrate more fully some of the above points reference is made to Figs. 2 and 3. These show the variability in cathode coating weight for a particular type of radio receiving tube. Fifty cathodes are inserted in a holder all in the same plane and parallel with each other. The holder with the cathodes is mounted vertically and is made to pass back and forth several times in front of a spray gun.

Coating Weight Important

In this particular process, coating weight is the important dimension; Fig. 2 shows the results of the process before quality control was inaugurated. Each point on the average chart represents the average weight of five cathodes taken in sequence. The solid line represents the grand average of all the subgroups of five. Each individual point on the range chart represents dispersion within a subgroup, that is, the difference between the maximum and the minimum reading of each group of five samples that were selected.

The solid line represents the average of the individual ranges of all subgroups of five. An examination of Fig. 2 indicates that the process is uncontrolled. No attempt has been made therefore to show control limits because of the uncontrolled condition of this particular process.

In Fig. 3, results of the same process are shown after eliminating some of the disturbing factors which had been affecting the process and which were discovered only after the application of the control chart method. Control limits have been added both to the average and to the range charts. These are shown by dashed lines. Fairly good control was obtained until sample No. 30 was taken and it will be observed that for this sample and for the next eight samples there was a distinct change of level in the sample average weights observed. It was determined that during this period the spray guns were adjusted improperly. Therefore the cathodes sprayed would contain a high percentage of defective items which would have to be screened

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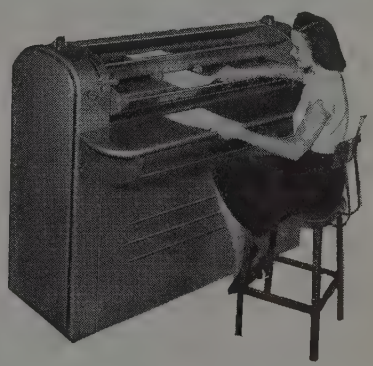

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out. A correction was made and beginning with Sample No. 39 the chart indicated fairly good control.

A great many benefits may be derived from making a study such as that outlined above.

1. Since in this instance uniformity is of greater importance than a specific weight level it was possible to broaden the specification limits. When this can be done manufacturing and engineering personnel develop a high regard for specification tolerances and will co-operate in correcting process variations when it is felt that specification limits are rational.

2. When manufacturing and engineering representatives have a picture of a process actually as it exists, confidence can be had that the product conforms to specifications. In the past it had to be assumed that a product was meeting specifications, which assumption has been proved erroneous many times.

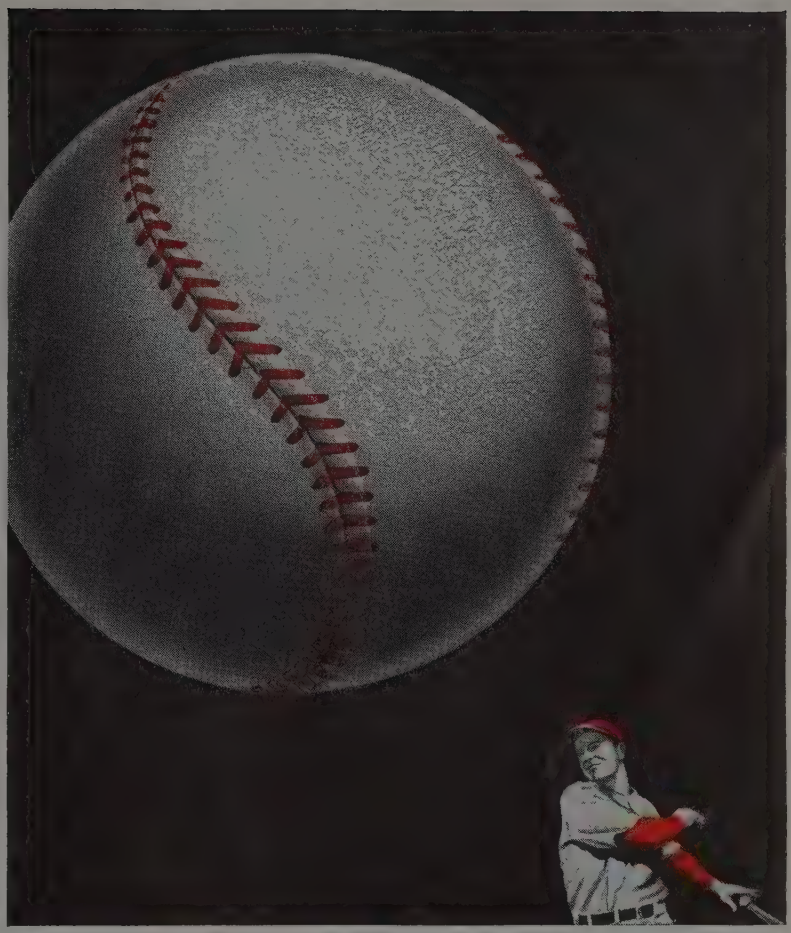
3. During a period of noncontrol such as occurred during points 30 to 38 inclusive, definite action can be taken both as regards locating the cause of the irregularity and correcting it and screening the product produced during the out-of-control period. During periods of control, testing is unnecessary other than for the small sample taken at regular intervals.

Responsibility Promptly Placed

4. As control chart data may be made available promptly and in picture form, a definite protection is afforded the department producing a product in the event of future complaints. Because of this, responsibility for poor work can be placed promptly and effectively with those concerned.

5. Using a control chart as a means of setting up processing standards and of making process adjustments has been the method by which optimum performance is attained. This method has resulted in improved cost and efficiency both from the standpoints of a reduction of machine maintenance and adjustment time and of a decrease in inspection required and scrap produced. In other words the inspection required and the scrap produced are greater for the process shown by Fig. 2 than for that shown by Fig. 3.

The above example portraying the use of control charts on a practical basis and listing some of the benefits which may be derived is but one of many such which could be cited. Modern manufacturing methods and procedures are so many and so varied that it is almost impossible to have information concerning them, much less control them, without the assistance of scientifically tried and proved procedures installed and operated on a regularly scheduled basis.



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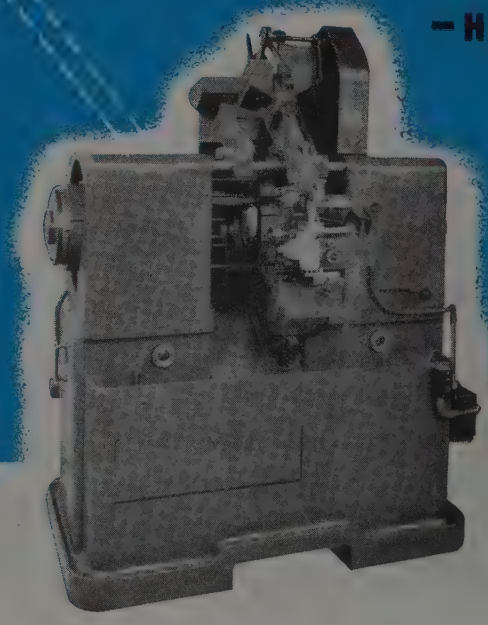

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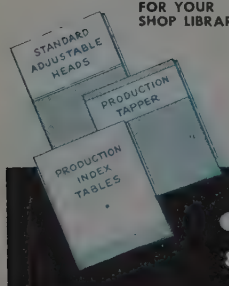

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Metallurgical Developments

(*Continued from Page* 105)

during the finishing period and to produce a steel of the same quality as one made under a calcium carbide slag.

(2) The silicon carbide addition gives rise to exothermic reactions and shapes up rapidly, forming a clinging slag-metal interface similar to that obtained in the silicon slag. At the same time, owing to its dissociation into elemental silicon and carbon at the very outset, silicon carbide provides rapid deoxidation of the slag.

(3) Lime content of the slag, slag volume, fluidity and temperature are among the factors contributing to the removal of sulphur during the refining finishing period. The silicon carbide slag compares favorably under each of these criteria. It was reported that more "free lime is available in the slag as none of this silicon carbide addition is consumed in the formation of the calcium carbide slag and additional desulphurization follows the chemical reaction between the nascent silicon from the dissociation of silicon carbide and sulphur, whereby silicon sulphide is formed and escapes as a gas.

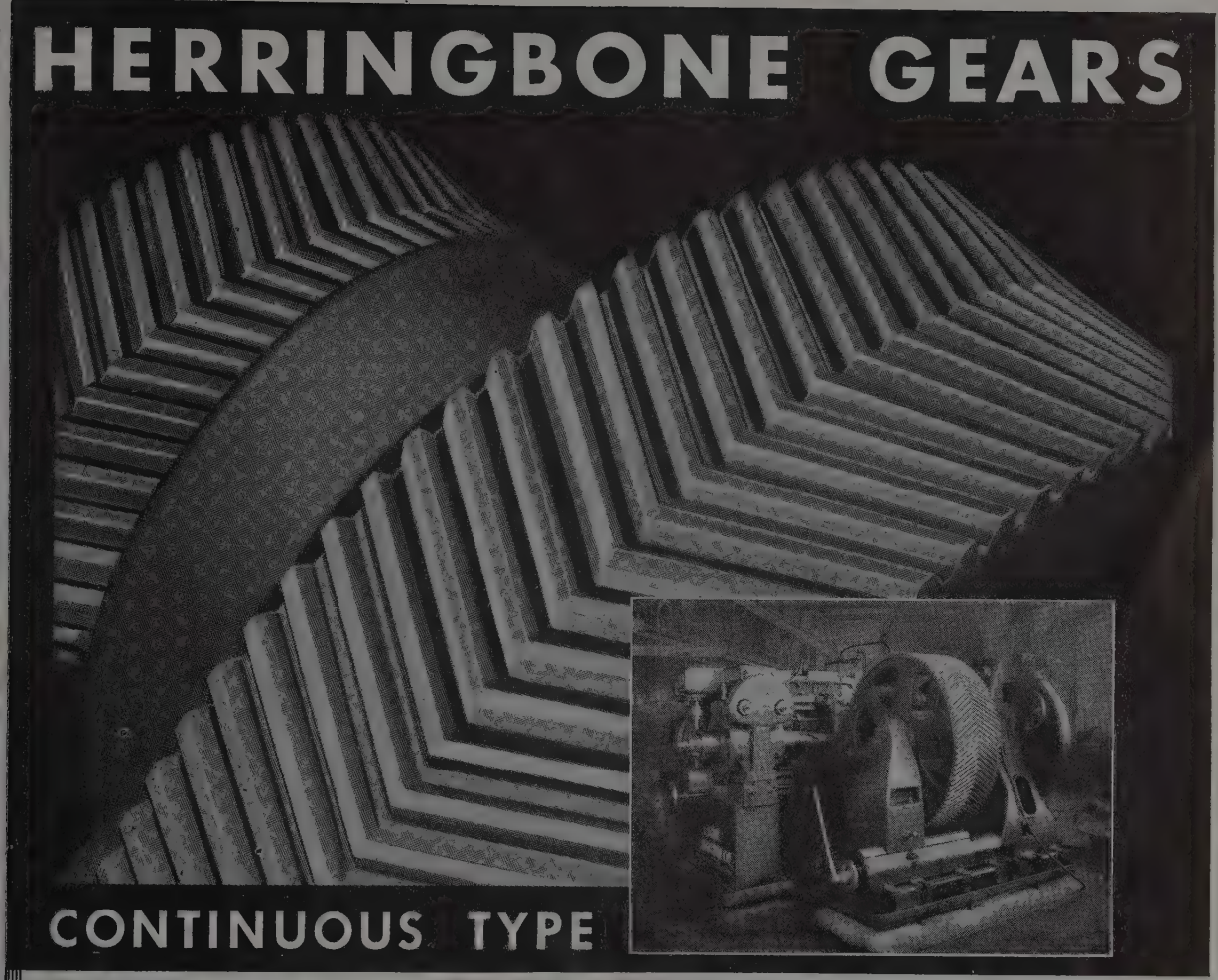
Apparatus for Three-Phase Arc Furnaces: Included in the scientific session on electric steel was a discussion of present day electric apparatus for three-phase arc furnace installations by N. R. Stansel and A. R. Oltrogge of General Electric Co. Characteristics of the arc furnace circuit as discussed are shown in Fig. 3. The fact was brought out that with a constant applied voltage the power in the furnace, or rate of heat development, varies with the current.

Thus the regulation of an arc furnace for constant power means holding the current constant. This regulation is accomplished by a more or less continuous adjustment of the length of each of the three arcs, particularly during the melt down period.

Other functions of the regulating system are to start the arcs and to feed the electrodes down as they are consumed. It was emphasized that an automatic circuit breaker such as shown in Fig. 4 is important from the standpoint of protection from electric damage. Also, the point was brought out that the efficient electric operation of an arc furnace requires the use of an ammeter in each phase and a wattmeter. Also, it was reported that since the regulation of the current in an arc furnace circuit requires frequent movements of the electrodes, both up and down, proper provisions must be made for a satisfactory electrode regulating system.

Electrolytic Cobalt: At the opening session on the electrochemical behavior

HERRINGBONE GEARS



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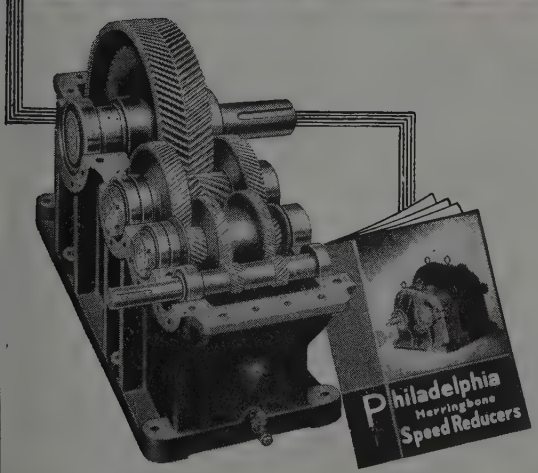

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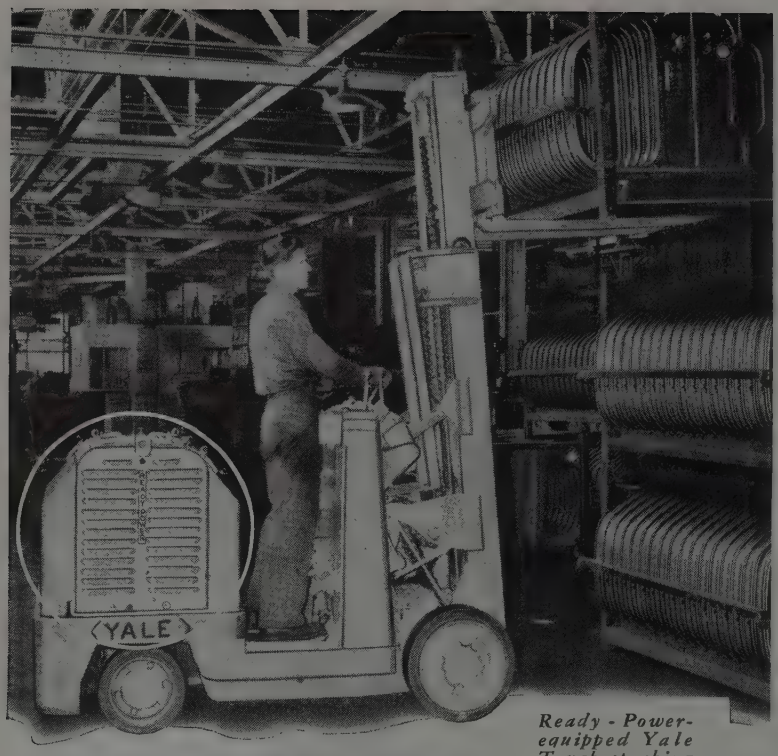

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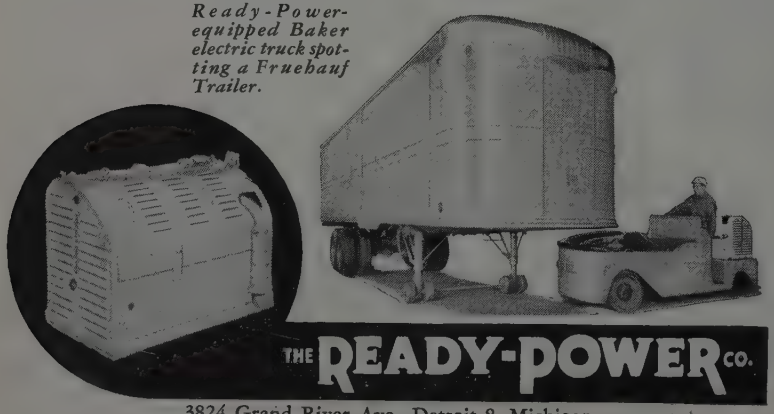

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of metals, a commercially feasible process for the electrolytic production of cobalt was described by engineers of Boulder City, Nev., experiment station of the Bureau of Mines. Cobaltite, cobalt sulpharsenide, is the preponderant mineral in the major cobalt ore reserves of the world.

The process for producing high-grade electrolytic cobalt from cobaltite concentrates was outlined from data obtained in extensive laboratory tests and pilot plant operations carried out in the Boulder City laboratories. Sufficient data have been accumulated to form the basis for designing a commercial unit for the production of electrolytic cobalt. This paper is one of the many reporting on various aspects of the Bureau of Mines' program initiated in August, 1929, by passage of the Strategic Minerals Act, the scope of which was greatly expanded by subsequent legislation.

As in most process metallurgy, the first major operation on the raw ore is the most critical. It was pointed out by the Bureau of Mines that the roasting of cobaltite was no exception to this rule. Two different types of electrolytes were used for cobalt electrowinning. The first was a fluoborate electrolyte containing about 50 g/l boric acid, 5 g/l sodium fluoride, and about 20 g/l cobalt as cobalt sulphate. The second electrolyte studied by the investigators contained only cobalt sulphate and incidental salts. This electrolyte contained about 40 g/l cobalt, although greater concentrations may be better.

Mechanism of Oxidation and Tarnishing: Opening the agenda of scientific papers on the subject of corrosion was a paper on the mechanism of oxidation and tarnishing by U. R. Evans, University Chemical Laboratory, Pembroke Street, Cambridge, England. A theory was developed by Evans to explain why conditions prevailing at the time when a metal specimen is first exposed decide the corrosion rate, which often continues unchanged even when conditions of exposure change. The thickening of oxide and sulphide films on metals can occur in different ways. According to Evans, outward migration of cations and electrons, normally by lattice defects, gives parabolic film growth, but mechanical breakdowns due to compressional stresses, of which good evidence exists, may lead to other equations.

It was brought out in Evans' paper that an oxide film, as freshly formed on metal, may be compared to a compressed spring, except that the compression exists in two dimensions instead of only one. There are three separate ways in which a laterally compressed film can break down, releasing much of its energy of compression. It can form a blister, it

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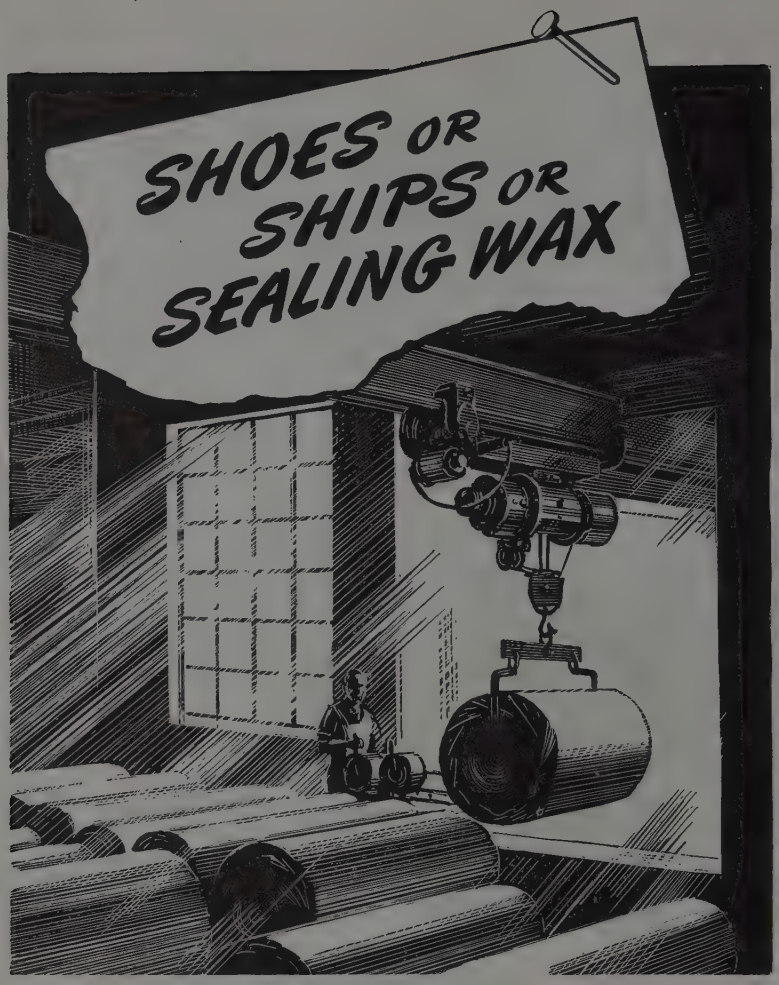

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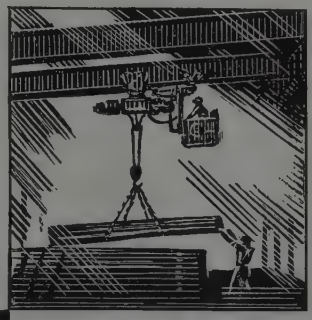

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can break and partially flake off, or it can develop shear cracks. Blistering generally involves detachment but no real breakage and may be expected when adhesion is poor and cohesion is good.

Shear cracking involves breakage but no detachment and may be expected where adhesion is good and cohesion poor. Flaking is likely to be a rather rare phenomenon, but when once started, may be expected to spread rapidly.

Corrosion Resistance of Magnesium: Continuing the technical session on corrosion, it was reported by R. R. Rogers and W. Dingley of the Department of Mines and Resources, Ottawa, Ontario, Canada, that addition of small amounts of lead and silver improved the corrosion resistance of magnesium castings at elevated temperatures and conditions of high humidity. Under the conditions of corrosion described of relatively high humidity air at 204°F (95.5°C) it was reported that the average corrosion rate of commercially pure magnesium and the AZ80x, AZ63x, and M1 magnesium alloys may be greatly decreased by the addition of 1 per cent silver.

In addition, the data presented by the investigators showed that the average corrosion rate of commercially pure magnesium and for the AZ80x and M1 alloys will be decreased by the addition of any one of the following: 0.1 per cent silver, 1 per cent lead, 0.1 per cent lead, 1 per cent silver plus lead, 0.1 per cent silver plus lead. The corrosion resistance of the AZ63x alloy was reported to be increased by the addition of any one of the following: 0.1 per cent lead, 1 per cent silver plus lead, 0.1 per cent silver plus lead.

Zirconium Rectifier: In a paper entitled "The Electrolytic Valve Action of Zirconium," Walter R. Carmody of the Northwest Electrodevelopment Laboratory of the U. S. Bureau of Mines, Albany, Oreg., presented data to show that zirconium is a suitable electrode material for an electrolytic rectifier when used with sulphuric acid as the electrolyte. Its behavior is practically identical to that of tantalum, with the exception that its breakdown voltage is somewhat lower than that of tantalum.

It was brought out by Carmody that the current capacity of the zirconium electrolytic rectifier is limited by the rate at which it can dissipate the heat generated within the rectifier. The relationship of zirconium to tantalum in the periodic table of the elements suggests that it might have valuable rectifying properties similar to those of tantalum, and the possible availability of zirconium in commercial quantity makes a detailed study of the properties of the metal, in this respect, very desirable.

In the studies reported by Carmody, a

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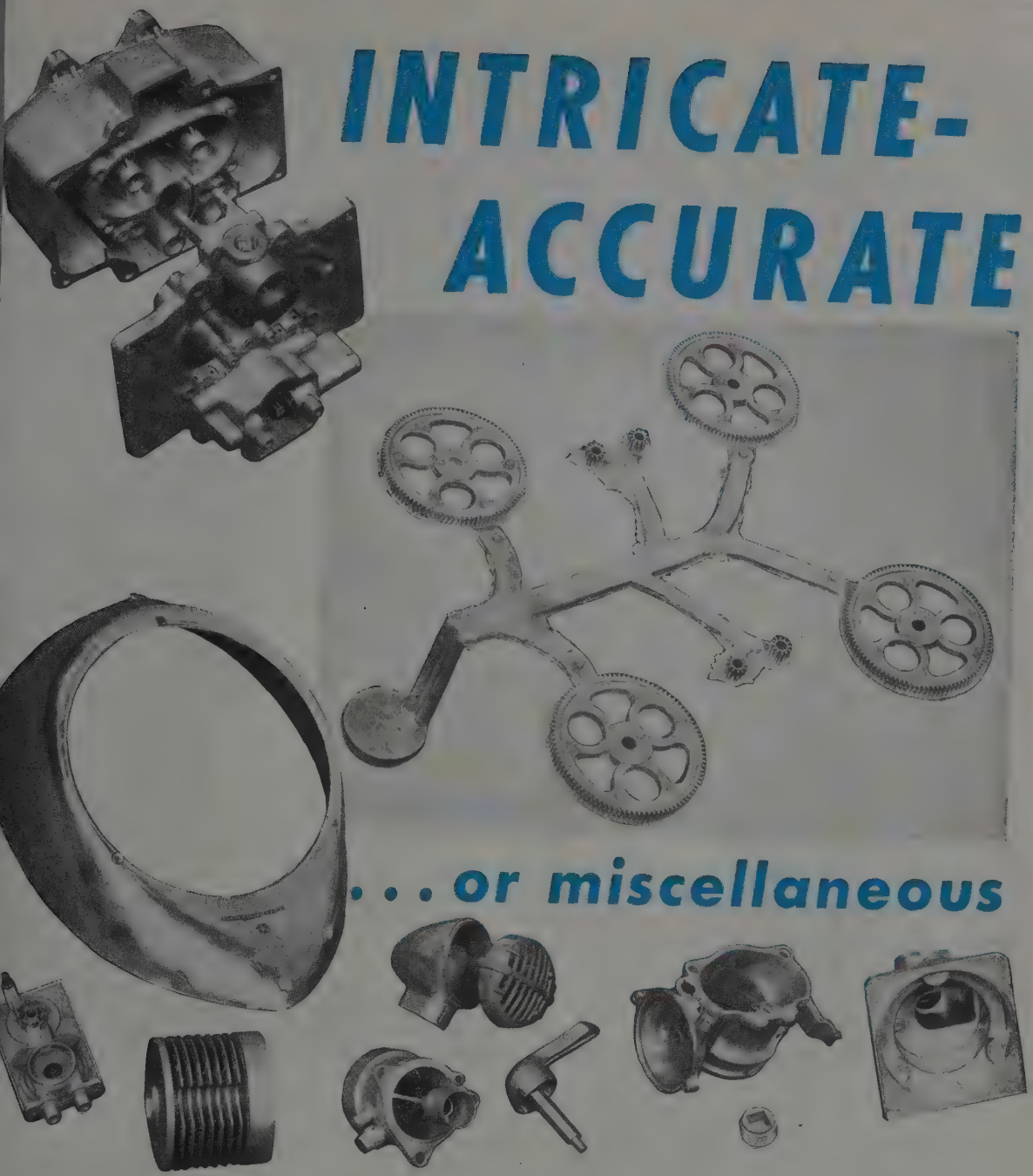

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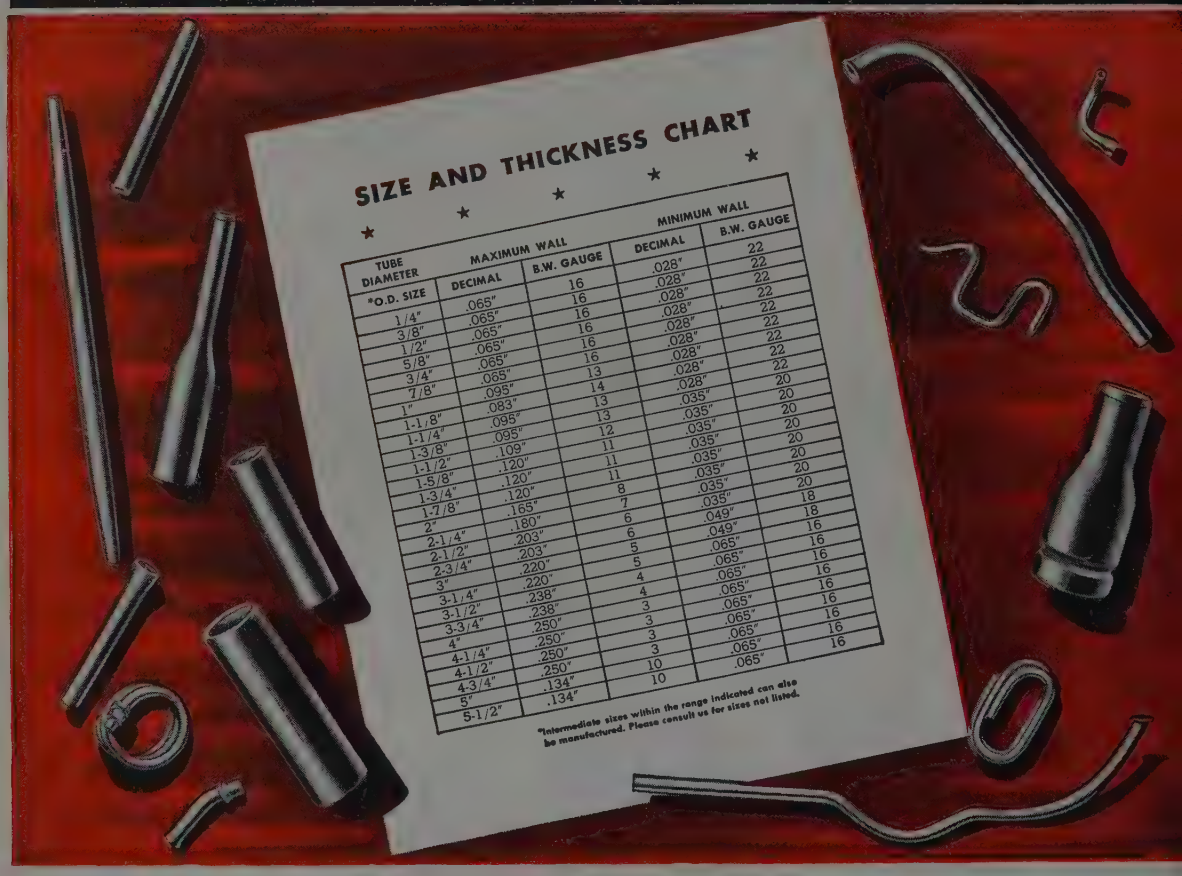

SIZE AND THICKNESS CHART

TUBE DIAMETER "O.D. SIZE	MAXIMUM WALL DECIMAL	MAXIMUM WALL B.W. GAUGE	MINIMUM WALL DECIMAL	MINIMUM WALL B.W. GAUGE
1/4"	.065"	16	.028"	22
3/8"	.065"	16	.028"	22
1/2"	.065"	16	.028"	22
5/8"	.065"	16	.028"	22
3/4"	.065"	16	.028"	22
7/8"	.095"	13	.028"	22
1"	.083"	14	.028"	22
1-1/8"	.095"	13	.035"	20
1-1/4"	.095"	13	.035"	20
1-3/8"	.109"	12	.035"	20
1-1/2"	.120"	11	.035"	20
1-5/8"	.120"	11	.035"	20
1-3/4"	.120"	11	.035"	20
1-7/8"	.165"	8	.035"	20
2"	.180"	7	.035"	18
2-1/4"	.203"	6	.049"	18
2-1/2"	.203"	6	.049"	16
2-3/4"	.220"	5	.065"	16
3"	.220"	5	.065"	16
3-1/4"	.238"	4	.065"	16
3-1/2"	.238"	4	.065"	16
3-3/4"	.250"	3	.065"	16
4"	.250"	3	.065"	16
4-1/4"	.250"	3	.065"	16
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4-3/4"	.134"	10	.065"	16
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amp continuous rating rectifier was ed to charge one to three 3-cell lead rage batteries and found to have a wer efficiency varying from 43 to 68 r cent depending on the number of tteries placed in series. Evidence was esented that indicated that the obstruc- n to the passage of current through e zirconium electrode in the rectifier is entially a potential barrier of approxi- ately 6 v.

hree-Phase Welding

(*Continued from Page* 98)

imaries reverses its direction at a pre- termined rate and that the magnetic ld in the core reverses its direction the same rate. Since the secondary wound upon the same core and is erefore affected by this field, a voltage ll be generated in the secondary which ll force a current through the second- y circuit which has the same character- ics as in the system previously de- ribed.

It is evident that there are some ad- ntages to welding with frequencies low 60 cycles. For instance, instead the skin effect increasing the resistance the secondary circuit to 2.3 x the dc lue, as it does when operating on 60 cles, if operation is in the neighbor- od of 3 to 6 cycles per second, the crease in resistance due to skin effect negligible. The introduction of heavy eel plates in the throat of a welder erating at low frequencies affects very tle the current passing through the condary circuit, thus making it unneces- ry to place current compensating de- ces on a welder of this type.

The rectifiers which are used for the oduction of direct current for this pe of equipment are inherently high wer factor devices. Three phase rec- iers with Delta Star anode transform- s operate at power factors in the neigh- rhood of 80 per cent; double three ase rectifiers, using an interphase trans- rmer, operate at a maximum of 95.5 r cent power factor, with very high ficiencies. The current in each of the es supplying three phase single phase achines are identical. This means that e heating effect is the same on each of e three lines and that the power dis- bution equipment is evenly loaded on three phases. Fig. 4 is an oscillo- am taken of the line current on a ree phase half wave rectifier supply- g a three phase single phase welder. g. 5 is an oscillogram of the line cur- nt in each of the lines supplying a uble three phase rectifier connected a three-phase single-phase welder. e can see from the oscillograms that ere is absolutely no high current transi- t on the line. This favorable opera-

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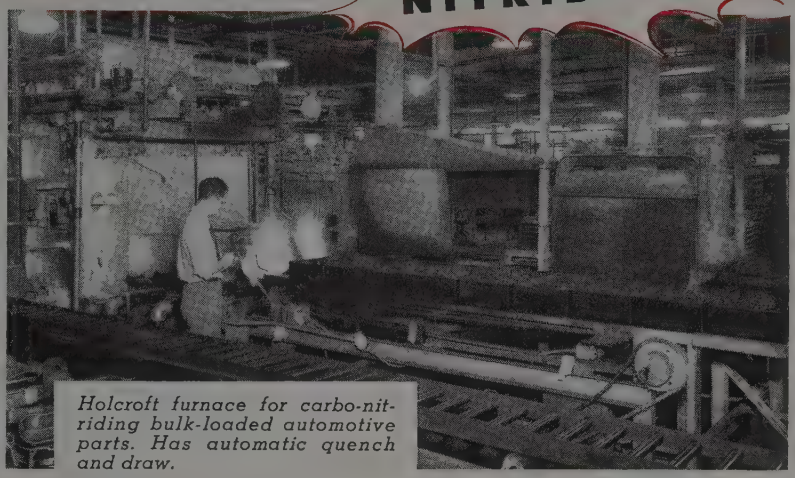

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Although the theory behind carbo-nitriding is mentioned in a patent issued in 1883, it was not applied to high-production furnaces until rediscovered independently by Holcroft & Company in 1936. The first furnaces of this type, built 11 years ago, are still in operation; and many other production furnaces installed since then have further proven the merits of this process.

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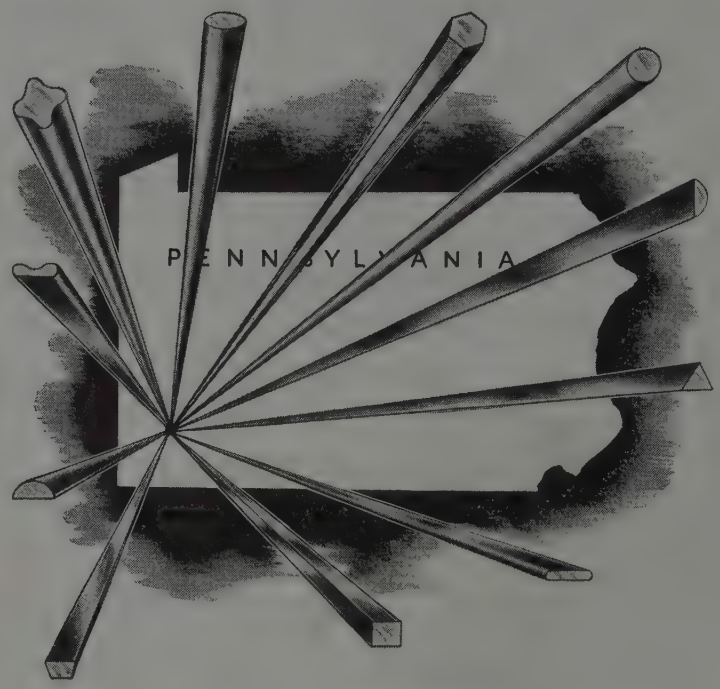
PAGE *Stainless Steel* WIRE



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tion exists whether we use synchronous timing equipment to control the firing of the rectifiers for each impulse, or whether we use nonsynchronous relay type of equipment.

It has been found that there are substantial savings in power in using the three phase single phase welding apparatus. Tests were conducted in the welding of ¼ plus ¼ in. clean mild steel on three-phase equipment and on conventional equipment of the same size. The curves in Figs. 8, 9 and 10 indicate the comparison between performance of the two types. All welding was done with a pressure of 4000 lb and a time of 4 sec, with a spacing between welds of 5 times the sheet thickness. The electrodes used had a 2 in. radius with a ½ in. flat.

One type of welder demands 255 kva, whereas the three phase welder demands slightly less than 100 kva in performing the same welding operation. This is a ratio of 2.55 to 1. Line current on the conventional machine was 535 amp as against 120 amp in the case of the three phase equipment. This is a ratio of 4.36 to 1.

Increasing Throat Impedance

In welders having greater throat depth than 24 in., more substantial reductions in kva demand are effected, since the throat impedance on a single phase welder increases substantially with an increase in throat depth, whereas the dc resistance increases very slightly, there being no more than a few microhms increase in resistance between a 24 in. throat machine and a 48 in. throat machine. This reduction in power requirements becomes very evident when we are faced with a problem of welding heavy sections of material.

For instance, in the welding of 3 pieces of ½ in. or two thicknesses of ⅝ in. scaly steel, the peak demand noted was 530 kva in order to produce a weld which had an acceptable strength and appearance. This welding was done on the apparatus shown in Fig. 1, which is a Sciaky type PMC5T2 portable unit designed for the welding of structural sections. This equipment allows a tip retraction of 17½ in. to accommodate various types of structural members, and utilizes hydraulic equipment for the production of tip pressures as high as 25,000 lb. The control circuits are so designed that a complete welding program suitable for the welding of scaly material may be realized. This welding program includes descaling, preheating at high pressure and low current, welding at low pressure and high current, quenching, annealing at high pressure and high current, and forging.

In the welding of the ⅝ plus ⅝ in. scaly steel, the program shown in the

An Airtight Story

HOW does Brandt of Baltimore figure in the story of an airtight bottle cap?

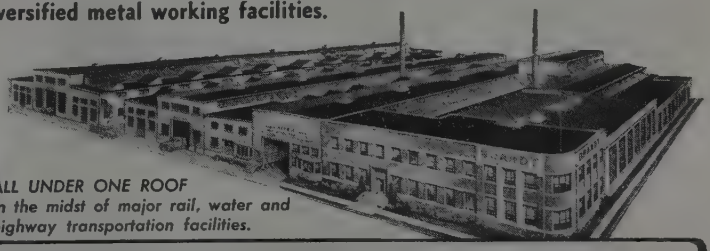
Take for example the Crown Cork and Seal Company. It makes an airtight bottle and can cap. A tough little cork disc is used. The disc is sliced from moulded sticks of granulated cork held together by a special glue mix. This binder is specially prepared in Semi-Circular Mixing Kettles made by Brandt. A large all welded stainless steel tank handles 2000 gallons of mix at one time, utilizing electric heating racks and a stainless steel helix paddle. Take any industry requiring specialized metal equipment in the handling or manufacture of its product and you'll likely find Brandt *somewhere* in the story. Large or small, if your metal working problem is special, call Brandt.

STAMPINGS FORMING
HEAVY WELDMENTS

Spot welded assemblies, plate fabrication, complete assemblies, crating and shipping facilities.

Mild steel, stainless steel, armor plate, sheet metal, aluminum, magnesium, non-ferrous metals.

A highly specified Naval Gun Housing for "Operation Mothballs." Just as a bottle cap must be airtight so must the protective housings on the U. S. Navy's Mothball Fleet. Here is another specialized product from Brandt's broad and diversified metal working facilities.



ALL UNDER ONE ROOF
In the midst of major rail, water and highway transportation facilities.

BRANDT
BALTIMORE

CHARLES T. BRANDT, INC., 1700 RIDGELY ST., BALTIMORE-30, MD.

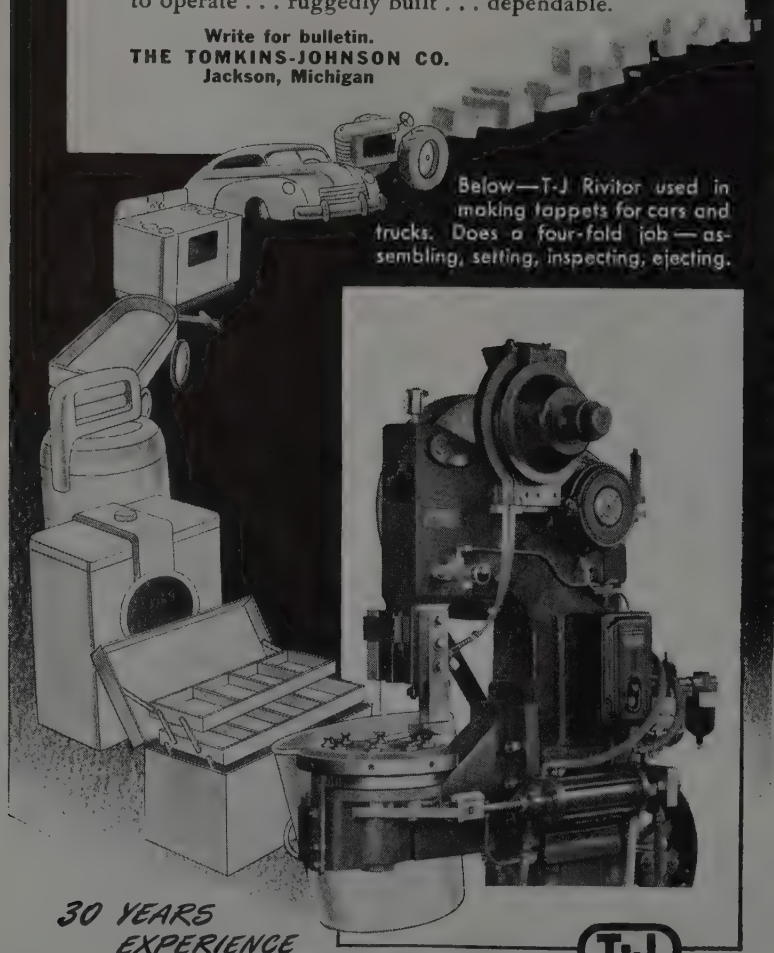
57 Years of *Specialized* Metal Working Experience

SET RIVETS at TOP SPEED
with T-J RIVITOR
AUTOMATICALLY
FEEDS AND SETS SOLID RIVETS

● Manufacturers in many fields today find the T-J RIVITOR fits into their production needs . . . *saving time . . . cutting costs . . .* and *doing a better, more uniform job* of setting solid rivets.

The T-J Rivitor has *controlled setting action*—assures a completely filled hole . . . no flashing . . . a neat, balanced head. Makes a solid rivet joint of 10% to 15% greater strength. Electrically powered for automatically feeding and setting solid steel rivets 1/16" to ¼" dia. incl. and up to ⅞" incl. long. Easy to operate . . . ruggedly built . . . dependable.

Write for bulletin.
THE TOMKINS-JOHNSON CO.
Jackson, Michigan



Below—T-J Rivitor used in making tappets for cars and trucks. Does a four-fold job—assembling, setting, inspecting, ejecting.

30 YEARS EXPERIENCE

T-J
TOMKINS-JOHNSON
RIVITORS

table was utilized. Were this welding operation attempted with other equipment of the same throat depth it would demand somewhere in the neighborhood of 1800 kva. The power company supplying a customer may not find it too difficult to service him for a 530 kva three phase demand, but some sources might be considerably hard pressed to supply the greater demand. Installation of extra facilities for this higher demand would mean additional expenditures in distribution apparatus and transformation equipment. Fig. 11 indicates the ratio of single phase to three phase line currents, and the ratio of kva single phase against three phase. We can see from this graph that for the 12 in. throat, the line currents supplying single phase welder is 2.96 times as great as the line currents supplying a three phase welder; and for a 48 in. throat machine, the single phase line currents would be 5.5 times the line current supplying a three phase machine doing the same welding job.

The kva demand for a 12 in. throat machine will be 1.69 times higher on a single phase machine than a three phase machine. The power factor of the single phase machine will be about 25 per cent, whereas the power factor at which the three phase machine operates will be above 80 per cent and as high as 95 per cent, depending upon the type of rectification equipment used.

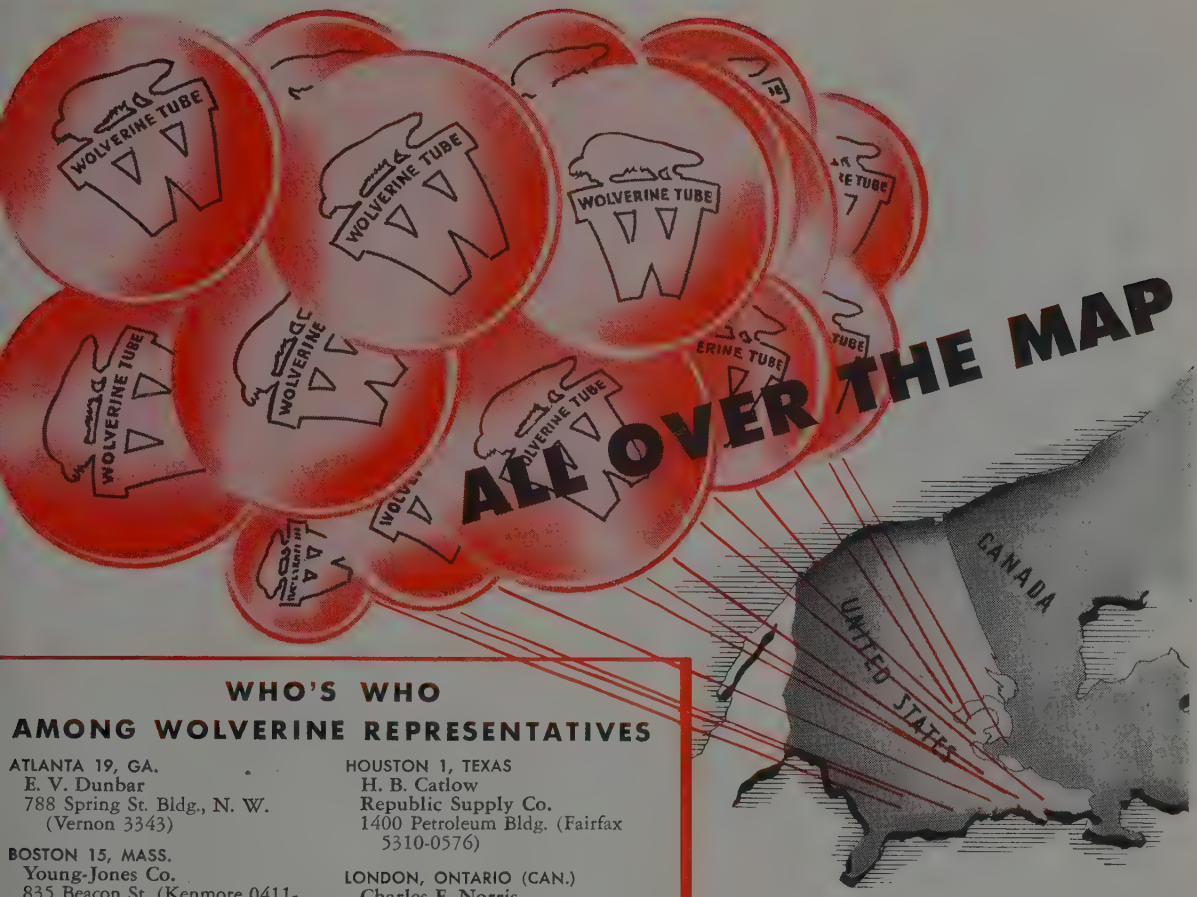
From a presentation made at annual meeting American Welding Society, Atlantic City, N. J., Nov. 17, 1946.

Chemical Intermediates Described in Bulletins

Chemical and physical properties of two recently announced organic chemical intermediates developed by B. F. Goodrich Chemical Co., Cleveland, are described in detail in technical bulletins issued by the company. The intermediates are known as Good-Rite rhodanine (2-thio-4 keto-thiazolidine) and Good-Rite 2-aminoethyl sulphuric acid.

Rhodanine is a crystalline heterocyclic compound, soluble in alcohol, ether, alkali and hot water. It contains an active methylene group which reacts readily with aromatic aldehydes to form derivatives useful as intermediates for the manufacture of arylamino, arylthiopyruvic and arylacetic acids, arylacetonitriles and arylethyl amines, all with unusually high yields, the company states.

The second, 2-aminoethyl sulphuric acid, is a crystalline solid of extremely high purity and is readily soluble in water but insoluble in most organic solvents. It is useful, Goodrich reports, as an amino-ethylating agent, reacting with most compounds containing an active hydrogen atom.



WHO'S WHO AMONG WOLVERINE REPRESENTATIVES

ATLANTA 19, GA.
E. V. Dunbar
788 Spring St. Bldg., N. W.
(Vernon 3343)

BOSTON 15, MASS.
Young-Jones Co.
835 Beacon St. (Kenmore 0411-0987)

BUFFALO 2, N. Y.
H. E. Rieckelman
416 Jackson Bldg. (Madison 2072)

CHICAGO 23, ILL.
G. D. Potter
Steel Sales Corp.
3348 S. Pulaski Rd. (Crawford 4400)

CLEVELAND 14, OHIO
Frank H. Grace
Frank H. Grace & Co.
1740 E. 12th St. (Main 2515)

DAYTON 1, OHIO
W. E. Campbell
P. O. Box 1041 (Fulton 6310)

DETROIT 9, MICH.
A. S. Kingerley
1411 Central (Vinewood 1-5000)

GRAND RAPIDS 2, MICH.
E. J. Campbell
206 Murray Bldg. (Phone 6-9311)

HOUSTON 1, TEXAS
H. B. Catlow
Republic Supply Co.
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Unifin Tube Co.
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Van D. Clothier
1015 E. 16th St. (Prospect 8326)

NEW YORK 17, N. Y.
G. H. Tobelman
C. E. Rinaman
60 E. 42nd St. (Murray Hill 2-8430)

PHILADELPHIA 2, PA.
J. H. Smith
1208 Commercial Trust Bldg.
(Rittenhouse 6-1442)

PITTSBURGH 2, PA.
W. R. Harding
Supplies, Inc.
1214 Liverpool St. (Fairfax 6330)

RIDGEWOOD, N. J.
F. R. Meier
544 Morningside Rd. (Ridgewood 6-5826)

Scattered from coast to coast—located in the principal manufacturing centers of the country—are Wolverine representatives—not mere somebodies sporting Wolverine identities — but individuals thoroughly familiar with the tube industry, ready to work with you on any problems concerning tubing or its applications.

And backing each of these men — here at the Detroit Mill — is a supporting organization of trained engineers whose extensive experience can be drawn on to augment your own facilities.

WOLVERINE TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

MANUFACTURERS OF SEAMLESS COPPER & BRASS TUBING

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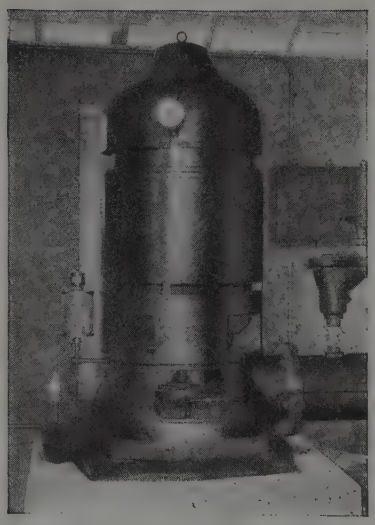


DOWN IN WARRINGTON, FLORIDA

Back in 1937, when the Peoples Water Service Company bought their first Layne Well Water System to serve the city of Warrington, Florida, they had only 263 connections. But Warrington, being a fine home city, grew larger and larger. By 1941 a second unit was needed, and being guided by an appreciation of known quality, none but a Layne Well Water System was to be considered. In 1945, connections had increased to 3,200, so again additional water supply was needed.

Peoples Water Service Company now have their third Layne Water System . . . one of the finest and most complete in the entire state. Powered with a 100 h.p. electric motor, turning at 1170 r.p.m., this new system is producing 1150 gallons of water per minute. The well is underreamed and packed with 20 yards of sized gravel.

Standardization on Layne Well Water producing equipment, was a very wise move. Production cost of water is exceptionally low and dependability of equipment is a major asset.

For further information on Layne Well Water developing service, address Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

***LAYNE PUMPS* for lakes, rivers, reservoirs, irrigation, for any use where large quantities of water must be produced at low cost. Sizes range from 40 to 16,000 gallons per minute, powerd by electric motor, V-belt or right angle gear drives. Write for Layne Pump Catalog.**

LAYNE

WELL WATER SYSTEMS

Turbine Pumps

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Pacific, Inc., Seattle, Wash. * Layne-Texas Co., Houston, Texas * Layne-Western Co., Kansas City, Mo. * Layne-Western Co. of Minn., Minneapolis, Minn. * International Water Supply Ltd., London, Ont., Can. * Layne-Hispano Americana, S. A., Mexico, D. F.

Use of Oil Coolants

(*Concluded from Page* 113)

60 gal of water, and ¼ to ½-oz Oakite to each gal of water.

On certain types of work where cooling is the main consideration, and where operator's hands are not continually in solution, or where the solution does not flow over bearings of machine, a grinding coolant, based on the following formula, will provide many advantages: Two to 4 oz of Oakite, 1 gal of water.

This gives a clear, transparent solution, providing better visibility of work, and advantage which many operators appreciate on certain types of work. However, it should be noted particularly that on shellac, glue and some of the other organic-bonded grinding wheels, the use of water-coolants should be avoided.

In general, whichever formula is best suited for a particular type of work it will be found that the grinding coolant keeps wheel clean and free-cutting and contributes toward producing work of close tolerance and fine finish. Rust is eliminated. Loading and glazing of wheel is reduced to a minimum. Wheel dressing will be far less frequent. Chips settle out of solution quickly. And further, the experience of shops and plants successfully using these grinding coolants over a period of many years clearly indicates their economy and long life.

To keep the workpiece cool and the wheel free-cutting and clean in crush form grinding, use soluble oil in the dilution ratio of 1 gal of oil to 20 to 60 gal of water, depending on cooling and lubrication requirements. One quarter to ½-oz of Oakite to each gallon of water will help keep coolant on alkaline side, lower surface tension of water and tend to prevent loading and glazing.

Machining Aluminum: Machinability of aluminum obviously varies according to its alloy composition and grain structure. Heat generated in machining is cause of thermal expansion of work and is a common problem necessitating, in general, the use of cutting fluids high in cooling ability to carry off heat. Machining at high speeds with light cuts is usually good practice. It is important when machining aluminum, to provide a generous supply of cutting fluid to the work itself and the cutting tool. Soluble oil cutting emulsions are being used successfully on many operations for which starting point formulas are given in Table III.

Magnesium Alloys: While cooling and fast removal of heat generated in cutting is essential in machining magnesium, straight cutting oils, instead of oil-water emulsions, are preferred and should be used as a matter of general safety. This is primarily due to fact that hot magnesium chips, when wetted with wate are flammable. Accordingly, most au thorities recommend straight cutting oi for use on various machining operation Spontaneous combustion hazard an problem is probably best answered b avoiding use of water-soluble oils as coolant on this metal.

Metallic Grains Measured By Comparing with Photos

Provision for counting metallic grai in a certain area or estimating their e tent by comparison with a series standard photographs is made by a grai size comparator developed by Westing house Electric Corp. research labora tories, Pittsburgh. The comparator, co sisting of a ground glass screen hinge to an illuminating unit with a slotte wooden frame, is easily attached to standard metallograph.

To determine the grain size of a pa ticular specimen, a polished and etche sample is placed on the stage of th metallograph and projected in magnifie form on the glass screen, its granul boundaries showing in clear, map-lik form. A transparent slide of a known standard grain structure is slipped in the wooden frame and illuminated b incandescent light.

Magnifying power of the metallograp is then changed by extending the bellow until the unknown image matches th grain size of the standard. Amount adjustment needed is read from a sca on the metallograph, and grain size of th unknown specimen is then determine by reference to a standard graph.

Carbide Punch and Die Set Lengthens Die Life

Dies formerly used by Underwoo Corp., Bridgeport, Conn., were found last only 1/40 as long as the cement carbide punches and dies now used f punching holes in small steel hinges. Tw carbide bushings and two solid carbi cylinders, made by Carboloy Co. Inc., D troit, make up the punch and die set.

Carbide cylinders are mounted in har ened steel punch bodies and fastened in the upper die block. Bushings of carbi are mounted in lower die block and tw steel pins are installed to line up the d blocks before the carbide punches conta the work on each stroke, preventing th extremely hard punch from hitting th equally hard die.

At the present time it is reported th the Carboloy punches and dies ha shown no appreciable signs of wear aft more than 1,000,000 hinges have bee punched. Dies formerly used had to b taken down and rebuilt after an avera of 25,000 pieces.

A HABIT TO JOE...

"NEW IDEA" TO HIS NEPHEW

..YET BOTH WANT THE SECURITY your P.S. Plan Provides

AVE YOU told all your new or recently hired employees about the benefits the Payroll Savings Plan for the regular purchase of U. S. Savings Bonds? Vage earners, according to a recent nation-wide survey, want security ore than anything else. They prefer security to big pay, soft jobs, au-ority, "success."

There is no surer way to this peace of mind than systematic savings. And hat surer, safer, better means can your employees find than payroll allot-ents for U. S. Savings Bonds? Bonds that return $4 at maturity for every they invest!

Your active support of the Payroll Savings Plan is an investment in nployee contentment, in the citizenship of your community, and in the curity of America's future. This is practical "employee relations" of the ghest type and pays dividends of satisfaction to everyone.

Start a drive today for larger participation in the plan. Many employees ay be unfamiliar with its advantages. If you want literature for distribu-n, contact your State Director of the Treasury Department's Savings nds Division.

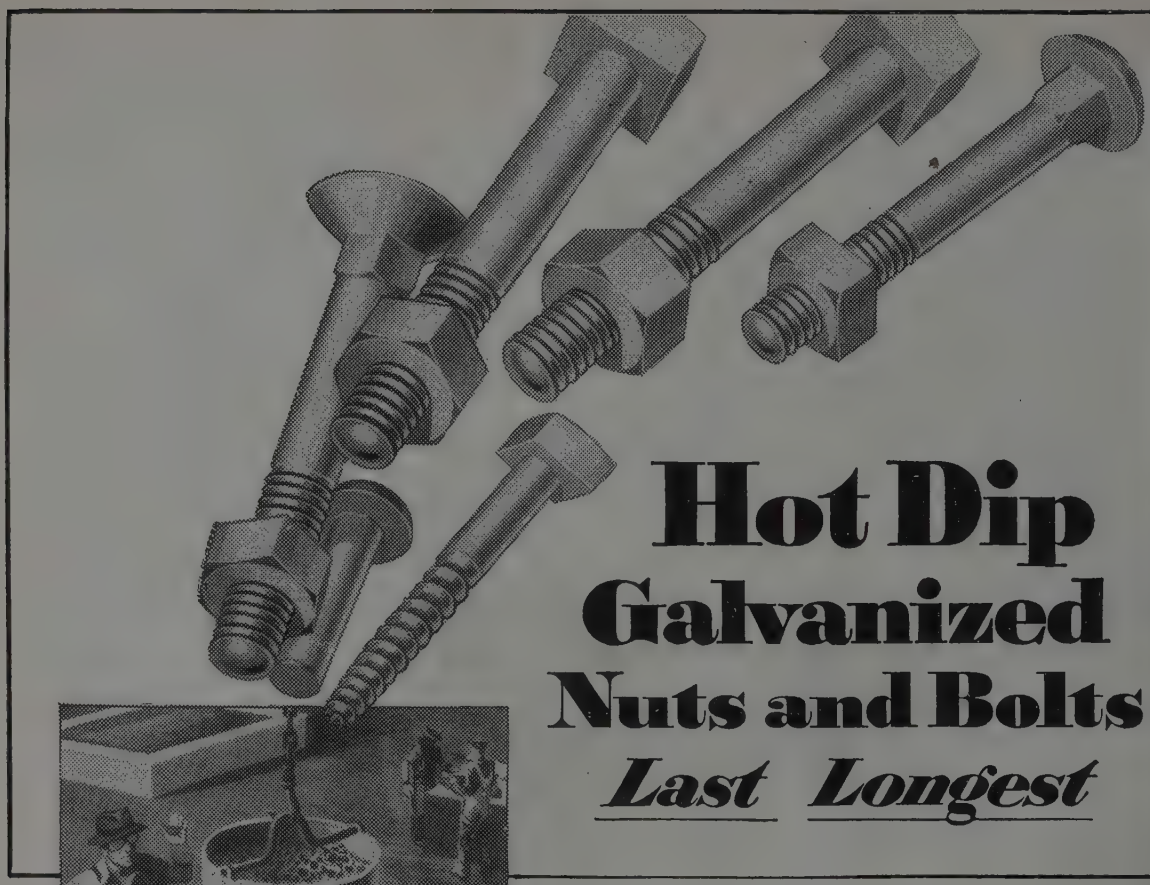
New Savings Bonds Plan won't affect the P.S.P.

THE Treasury Department and the banks of America are making it possible for farmers, doctors, and other self-employed people to participate in "automatic" Bond buying by special arrangement with their banks. This extension of the Savings Bonds program is not a partial payment plan and is intended *only* for people who are not in a position to take advantage of the Payroll Savings Plan.

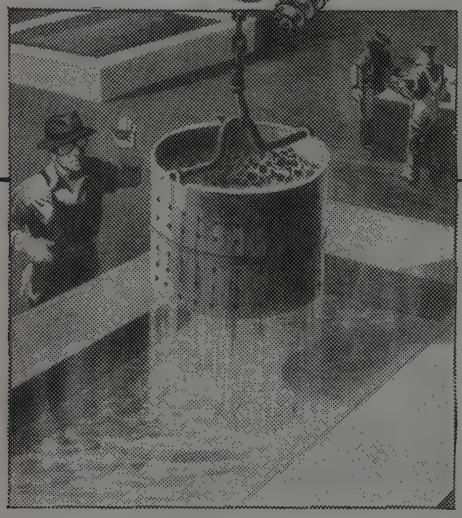
The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

is is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.



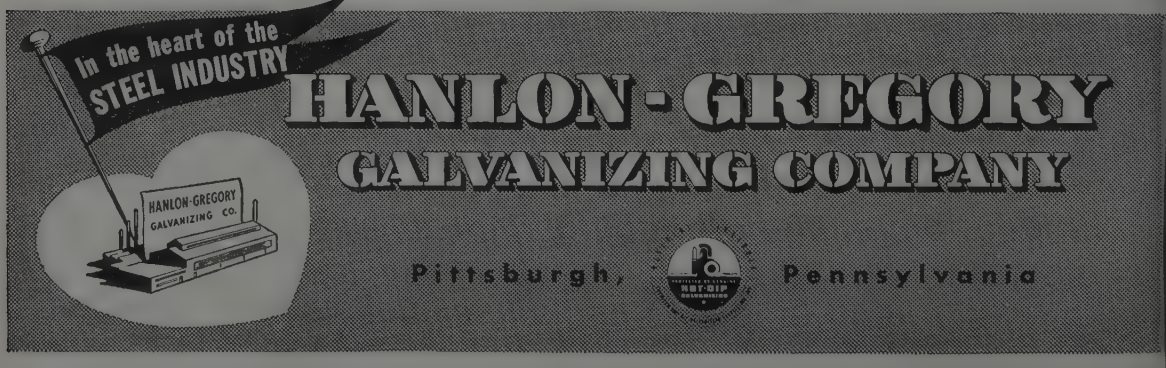
Hot Dip Galvanized Nuts and Bolts *Last Longest*



Nuts, Bolts, Turnbuckles, Lag Screws—*all metal fasteners* that are exposed to the ravages of rust—give longer, uninterrupted service when dipped in molten zinc by the Hanlon-Gregory method of Hot Dip Galvanizing.

The World's Largest Job Galvanizing Plant is equipped to provide you the "utmost in rust prevention" for your products, in any quantity from truckload to carloads.

THE WORLD'S LARGEST JOB GALVANIZING PLANT



New Products and Equipment

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 148

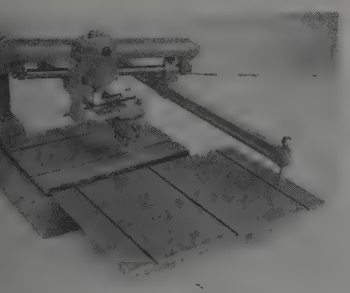
Milling Attachment

device whereby end and horizontal ing may be accomplished on a Bridge- vertical milling machine is available n Malnar Machine & Tool Co., 19301 Clair avenue, Cleveland 10. With new arbor support used in conjunc- with the Malnar horizontal unit, both

vhich are permanently installed, the ing machine becomes more versatile. n oilite bearing and center provide oth, vibration-free operation. Use of ariable-speed unit permits spindle ds from 10-1 on a constant drive ey. Changing pulley sizes on the or makes a variety of other reductions ible.

Three Dimensional Miller

ast, efficient contour milling, ac- te profiling and three-dimensional aving is possible with the new miller unced by Philbro Tool & Die Co., Broadway, New York 19. It pro- s a required shape or contour from

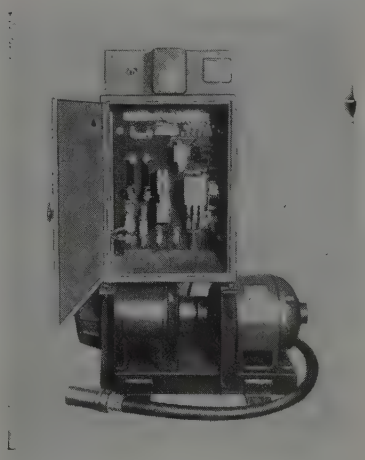


nlarged master. In operation, con- of master templates are followed a stylus arm controlled by the er's hand.

rtical milling head or spindle fol- automatically. The machine also and-controlled vertical feed to ½-in. ay be used in making small blanking dies, and irregular slots. Reductions are obtained through a pantograph mechanism set at the desired ratio. Roughing cuts may be taken with standard ¼-in. shank end mills, but for finishing operations, standard single flute engraving cutters may be used in conjunction with a taper sleeve.

3. Charging Equipment

Improved heavy duty battery charging equipment for industrial truck service, is announced by General Electric Co., Schenectady, N. Y. Packaged into one unit, it consists of a single-circuit battery



charging motor generator set, with control cabinet mounted on welded steel framework directly above.

Unit meets requirements of an 18-cell, 550-amp hour, lead acid type storage battery. Generator is a 47 v dc machine. A slide wire type resistor adjusts voltage. Equipment is completely automatic, charging the battery at the exact tapered rated indicated by the battery manufacturer.

4. Powder Camera

Developed for x-ray diffraction work, a new high intensity, high-resolution powder camera, made by North American Philips Co. Inc., 100 East 42nd street, New York, incorporates a new slit system that produces remarkably clean film patterns and reduces exposure time. Features are precise collimator and beam tube alignment and universal saddle mount. Design employs track having rectangular profile with reference and bearing surfaces hard chromium plated. A synchronous drive motor (1 rpm) is incorporated in the assembly.

5. Numbering Machine

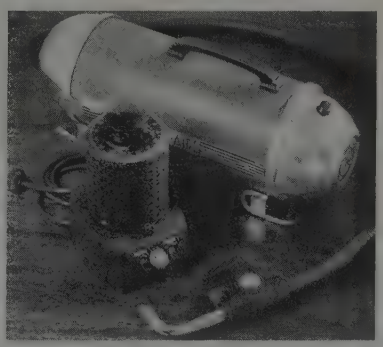
Acromark Co., 398 Morrell street, Elizabeth, N. J., introduces its heavy duty model HN numbering machine for operation on steel track and billets. Size of numbering wheel shaft varies with size of numbers and with number of wheels. Locking is accomplished by a lock that sets into a depression between the characters. Locking screw holds shaft in position.

6. Air Line Respirators

Guarded exhalation valves and a built-in air deflector assure low resistance to air flow and proper circulation within the facepiece of the air line respirator manufactured by Mine Safety Appliances Co., Pittsburgh 8. Units have either a cushioned face piece or an all-vision facepiece. They are equipped with cartridge type flow control valves, the cartridge acting as a secondary filter for removal of traces of oil and dirt from compressed air lines.

7. Abrasion Tester

Developed for use with the Taber Abraser, a research tool used to measure "wear mileage" of electroplated coatings,



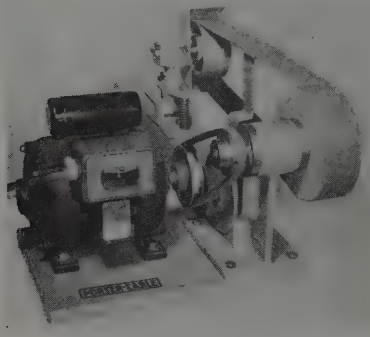
finishes, films, plastics, etc., a new accessory known as model 100-108 vacuum pickup attachment is announced by Taber Instrument Corp., North Tonawanda, N. Y. This attachment increases wear-testing efficiency, contributing to greater accuracy and more consistent reproducibility of test results, by con-

tinuously removing abraded particles from the surface of the test material.

A powerful 2-stage vacuum turbine, this pickup device provides variable controllable suction, centralized electrical connections for all Taber wear testing apparatus and adjustable swivel type suction nozzle. Unit is connected to abrasion tester by a rubber covered flexible tube.

8. Utility Grinder

A utility grinder which provides the advantages of grinding on an abrasive belt operating over a resilient contact roll or wheel is announced by Porter-Cable Machine Co., Syracuse, N. Y. Since wear is on the abrasive belt and not on the supporting contact wheel, this



wheel or roll remains flat, square at the corner and maintains its diameter and balance.

Flat work may be ground on a platen or an additional contact roll may be provided for grinding round or oval parts—or work may be done on the unsupported belt. Grinder is adjustable to 90 degrees, permitting work in either a vertical or horizontal position.

9. Solder Rod

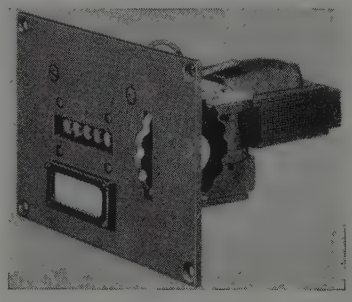
Cast iron solder rod, recently developed, produces corrosion resistant welds suitable for water and pressure tight applications where pressure does not exceed 1000 psi. Made by All-State Welding Alloys Co. Inc., 96 West Post road, White Plains, N. Y., it melts at 600°F and tins easily and rapidly. Known as No. 7 rod, it is to be used with the company's No. 7 flux.

10. Dust Goggle

Recommended for operations where fine dust particles and powder create an eye hazard, the new dust goggle announced by American Optical Co., Southbridge, Mass., also provides wide angle vision, good ventilation and wearer comfort. A fine wire screen (150 mesh) set behind a 16 mesh screen keeps out fine dust particles and powder. It is manufactured in several styles and lens shades.

11. Electric Counter

Designed for installation, reading and reset from the front of the panel, electrically operated counters for flush mounted installation are announced by Production Instrument Co., 704-16 West

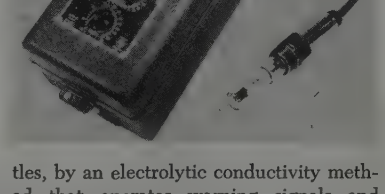


Jackson boulevard, Chicago 6. Any number of units may be centralized in one location.

Counters, called Wizard Panelmount, are actuated by electric impulses from any suitable switch, relay or photoelectric unit and may be located any distance from the source of the count. Units are made in four and six digit models with knob or key reset. They may be furnished in voltages up to 220 ac or dc.

12. Solu-Bridge Controller

Made by Industrial Instruments Inc., 17 Pollock avenue, Jersey City 5, N. J., the solu-bridge controller provides insurance against contamination of return steam condensate, particularly where steam is used for heating tanks and ket-



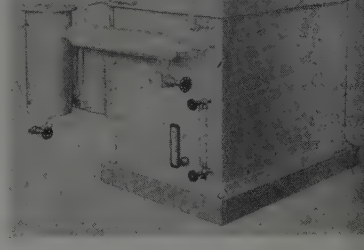
tles, by an electrolytic conductivity method that operates warning signals and valves to divert flow as desired. The controller consists of a compact alternating current Wheatstone bridge with a cathode ray tube as the balance indicator and a self-contained single pole double throw relay which reacts sharply to the unbalance of the Wheatstone bridge and delivers line voltage alternating current up to 2 amp for operation of warning signals and valves.

Controller may be mounted in any location and connected to the conductivity cell which is mounted in the re turn line of the boiler. Instrument ha a manual temperature compensator co ering the range 64 to 190°F. In pra tice this compensator would be set t the average temperature at the point installation of the conductivity cell.

13. Parts Degreaser

Designed for use with trichlorethylen the new type OP-1-48 vapor spra metal parts degreaser, made by Optimu Equipment Co., 147 Water street, Mata wan, N. J., is electrically-welded of 3/16 in. steel plate, reinforced by structura members. Body of unit and interna auxiliaries are hot dip galvanized afte fabrication.

Heating and cooling coils are re movable for cleaning and maintenanc



The unit acts as a still to recover th contaminated solvent. Chips and i soluble impurities and buffing compoun that have worked into sharp corners crevices, may be quickly removed b the use of a spray directed at the wor Heat to vaporize the solvent may b supplied by either steam, gas or ele tricity. Capacity is 200 lb of steel p hour.

14. Expansion Joint

An expansion joint of the packle anchor base elbow type is offered b MagniLastic Division of Cook Electr Co., Chicago 14. Available in all stan ard pipe sizes and in materials to me special corrosive, temperature and pre sure conditions, the joints are a stan ard line, carried in stock.

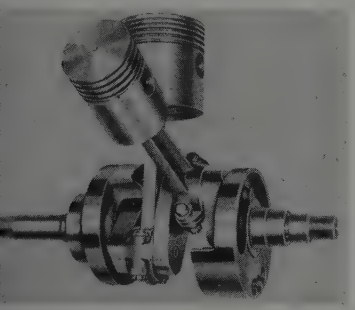
15. Cope and Drag Plates

Of cast aluminum and ground to clo tolerances, the cope and drag plat made by Kindt-Collins Co., 12653 El wood avenue, Cleveland, are for use jolt stripper or jolt roll-over moldi machines. Steel buttons are integral cast in along the flask line, greatly r ducing flask wear and eliminating mi ing, drilling, countersinking and tappi

erations ordinarily required.
ntegrally cast steel buttons cannot
loosened by jarring. Plates may be
ily reground and restored to original
ciency. Available in a variety of
es, plates also are made to order.

. Crankshaft

New type crankshaft which eliminates
compressor vibration and increases
mpressor life is announced by Davey
mpressor Co., Kent, O. Called the
ui-Balanced shaft, it spreads compres-
working strokes evenly over the 360



grees of shaft rotation. In 60 and 105
n V-type compressors, the new design
ploys a 2-throw crankshaft (illus-
ed). In conventional 60 degree cyl-
er arrangements, throws are spaced
120 degrees.
Crankshaft design makes possible a
mpact cylinder arrangement. Besides
cing working strokes equally, it does
ay with rocking motion and vibration,
ening maintenance on the machinery.

. Fume Resistant Enamel

An enamel resistant to alkali, acid and
phide fumes, applicable to interior
faces of brick, concrete, or metal, is
ounced by A. C. Horn Co. Inc.,
36 10th street, Long Island City 1,
Y. Supplied in a white semigloss
sh only, it can be applied by brush
thinned with turpentine for spray ap-
ation. The finish is washable and
not chip or flake.

, Brushless Paint

Permitting rapid application and pre-
ing a durable, weather-resistant sur-
e, Sleek, a brushless paint developed
Miler Corp., Garland building, Chi-
o, is suitable for application to both
al and wood surfaces. It may be
lied by lint-free cloth or brush, and
s completely in 3 hours.

. Panelboards

Manufacture of Noark NTPS panel-
rds for the control of light and small
er circuits is announced by Federal
ctric Products Co., Newark, N. J.
ilable in 4 to 12 circuits, flush or surface type, the boards incorporate a steel tension spring in the switch assembly which exerts constant pressure on stationary contact parts.

Feature of the units is the shallow depth of the steel enclosure, 3 7/8-in., which permits flush type panels to be mounted in thin walls of sheet rock, wall board, masonite and other materials.

FOR MORE INFORMATION
on products and equipment described in this section, fill in a card following page 148.

20. Magnetic Inspection Unit

Development of the BACS Magnaflux unit for volume inspection of crankshafts and camshafts in the production line is announced by Magnaflux Corp., 5900 Northwest highway, Chicago 31. Either circular or longitudinal magnetization is accomplished at the operator's option to conform to inspection requirements.

Concurrent inspection of two sizes of shafts is provided so that the unit may be regularly fed by two sizes of shaft at the same time. Cam and crank shafts are carried on a conveyor-mounted jig which is loaded from the plant conveyor or shop trucks. Inspection operations are all automatic. Satisfactory shafts are automatically demagnetized and rinsed before passing on to the next operation.

21. Cold Tank Cleaner

Faster removal of oil, grease, clips and other foreign matter that collects on parts during machining or other production operations is possible with the Turbulator tank, an automatic, multi-flow, cold tank cleaner manufactured by Turco Products Inc., 6135 South Central avenue, Los Angeles 1. Actuated by air volume, pressure differential and gravity, the unit cleans parts with a combined liquid scrubbing and solvent action.

Tiny metered orifices release compressed air which induces a flow of liquid in the inner tank. Cleaning compound is forced through and around the parts, depositing particles in a static sludge compartment. Parts are placed in a wire basket. Tanks are currently made in four models with capacities from 52 to 765 gal.

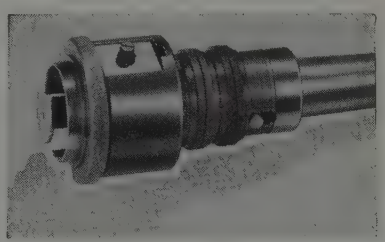
22. Dielectric Heating

Featuring a special cubicle providing two sets of operating controls to permit alternate operations of the generator on two different time cycles, the new 2-kw radio frequency 40.9-mc dual timer, manufactured by Westinghouse Electric Corp., Pittsburgh 30, has alternate power-on periods adjustable to 0 to 165 sec each. A capaciductor type high "Q" circuit provides a high rate of heating, easy heating of low power factor material and more effective heating of low loss factor preforms. Tank circuit is of removable shelf type.

23. Recessing Tool

Precision recessing, grooving, back facing and similar operations may be performed readily with the recessing tool made by F. A. Maxwell Co., 390 Broadway, Bedford, O. Adaptable for use in drill presses, boring mills, turret lathes, automatics, milling machines, etc., its tapered or straight shank, threaded into a tool sleeve, can be furnished to fit any machine. Cutter and pilot can be any required size or shape. Pilot assembly is ball bearing mounted to permit free rotation of either tool or work, depending upon application.

After the pilot is entered into work, the cutter is fed a predetermined amount

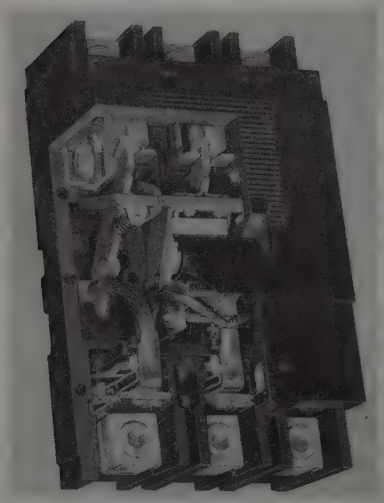


by means of rack and gear mechanism. Adjustable stop limits depth of cut or recess. One or more grooves of any required size and shape can be cut. Tool is designed for use on production or short runs. Four sizes are available for workpiece hole ranges of ⅜ to 1, 1 to 2, 2 to 3 and 3 to 4 in. Special shanks, pilots

and cutters can be supplied to meet user's requirements.

24. Circuit Breaker

Measuring only 10⅝-in. high and 6 in. wide, the new type ML-3 225 amp circuit breaker uses a new type of solderless connector which facilitates the insertion of heavy cable by swinging open the hinged top of the lug, according



to its manufacturer, Square D Co., 6060 Rivard street, Detroit 11.

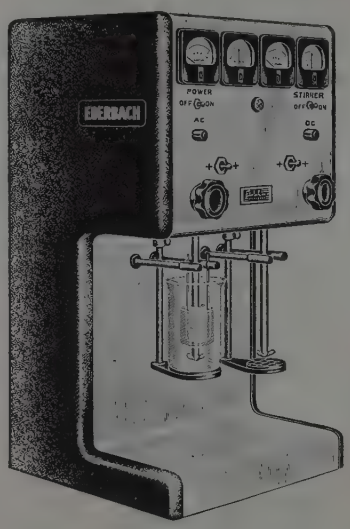
It is only necessary to cut the cable to proper length, remove sufficient insulation from the end and lay the cable into the lug, snap the hinged top into position and tighten the set screw. Trip ratings are 125 to 225 amp. Voltages are 125-250 v dc-250 v ac, 600 v ac-250 v dc. Breaker is available in sheet steel, dust resisting enclosures with side operated handle for three and four wire solid neutral applications in addition to two and three pole devices.

25. Freezer Alarm Switch

Freezer alarm switch which contains complete thermostatic element together with contact mechanism in a unit the size of an acorn is announced by Cutler-Hammer Inc., 320 North 12th street, Milwaukee 1. Applicable to various types of freezers, it serves to warn of dangerous temperature rises in remotely located units.

26. Analysis Apparatus

Built for constant service in industrial or production testing laboratories, the electro-analysis apparatus developed by Eberbach & Son Co., Ann Arbor, Mich., is adaptable for determinations of nickel, copper, lead, antimony, cadmium, zinc, chromium and other metals. A built-in selenium dry type full wave rectifier delivers 8 v 5 amp dc at both spindles for simultaneous determinations or 10



amp dc for a single determination, operating from line current.

Ammeter and voltmeter are included, the former indicating direction of current flow. Stirrers rotate at constant speed of 550 rpm. All electrodes, including rotating type, may be used. Front surfaces of unit are stainless steel. Meters and mechanism are contained in the unit to protect them from acid fumes.

27. Drop Bottom Skid Box

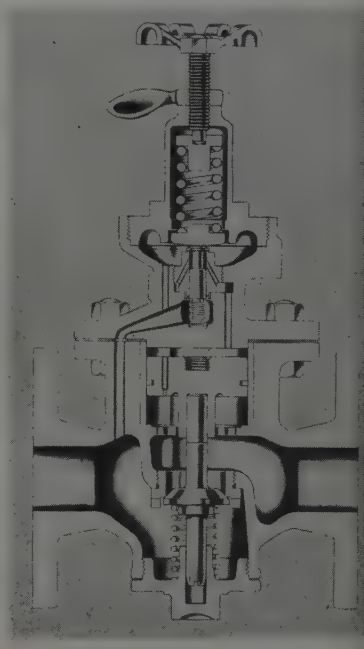
Manual emptying of steel skid boxes filled with small parts is eliminated through use of corrugated steel drop bottom skid boxes manufactured by Monroe

Auto Equipment Co., Monroe, Mich. Contents of each box are emptied by gravity at the will of the operator by opening a hinged bottom supported by two removable pins.

Designed for use with ordinary lift trucks, these boxes are available in six sizes with capacities from 1500 to 4000 lb. Each is equipped with skids for floor unloading. Offered separately as companion equipment are stands to hold the boxes at a height of 41 in. providing handy waist high work tables. Stands are supplied in sizes built for tiered loads from 4500 to 12,000 lb.

28. Overflow Valve

Applicable wherever it is required to maintain a constant inlet pressure by relieving the excess to a lower pressure system, throttling type unloading valve made by Leslie Co., 152 Delafield avenue, Lyndhurst, N. J., is for use with steam



air or gas. It provides smooth throttling control during entire cycle of operation combined with quick action under sudden pressure variations.

Construction features include high pressure bronze body, renewable wearing parts, hard surfaced seat ring, hardened stainless steel main and controlling valves, bronze piston, corrosion resistant piston rings and phosphor bronze diaphragm. It is offered in sizes from ¼ to 4 in., for inlet pressures from 25 to 300 psi, inlet temperatures to 550° F and pressure difference not less than 5 psi.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention

rip

-Rolled Strip: Pittsburgh, Chicago, Gary, mingham, Youngstown, base, 2.50c; Detroit, , 2.65c; eastern Mich., del., 2.70c.

d-Rolled Strip, 0.25 carbon and less: Pittsgh, Cleveland, Youngstown, 3.20c; Chicago, e, 3.30c; Detroit, del. 3.35c; eastern Mich., c; Worcester, base, 3.40c.

d-Finished Spring Steel: Pittsburgh, Clevel base: 0.26-0.40 carbon, 3.20c; over 0.40 to carbon, 4.70c; over 0.60 to 0.80, 5.30c; r 0.80 to 1.00, 6.80c; over 1.00, 9.10c; add c for Worcester.

n, Terne, Plate

Plate: Pittsburgh, Chicago, Gary, Warren, 100-lb base box, $5.75; Granite City, Birgham, Sparrows Point, $5.85.

ctrolytic Tin Plate: Pittsburgh, Gary, War- O., 100-lb base box 0.25 lb tin, $4.85; 0.50 in, $5.05; 0.75 lb tin, $5.25; Granite City, mingham, Sparrows Point, $4.95, $5.15, 5, respectively.

Mill Black Plate: Pittsburgh, Chicago, y, Warren, O., base 29-gage and lighter, c; Granite City, Birmingham, Sparrows nt, 3.70c.

nufacturing Ternes (Special Coated): Pittsgh, Chicago, Gary, 100-lb base box $4.90; nite City, Birmingham, Sparrows Point, 0.

ofing Ternes: Pittsburgh base per package sheets; 20 x 28 in., coating I.C. 8-lb $13.50; 6 $15.50.

ates

bon Steel Plates: Pittsburgh, Chicago, Gary, veland, Birmingham, Youngstown, Sparrows nt, 2.65c; Coatesville, Claymont, Geneva, h, 2.80c; New York, del. 2.94c; Phila., del., c; St. Louis, del., 2.47c; Boston, del., 2.86c; Francisco and Los Angeles, del., 3.29c- c.

ntral Iron & Steel Co., Harrisburg, Pa., c, basing points; Alan Wood Steel Co., shohocken, Pa., 2.80c, Coatesville and Clayt equivalent; Worth Steel Co., Claymont, , 2.90c mills.)

or Plates: Pittsburgh, Chicago, 3.90c.

en-Hearth Alloy Plates: Pittsburgh, Chicago, 7c; Coatesville, 4.15c.

d Steel Plates: Coatesville, 10% cladding: kel clad, 21.50c; inconel-clad, 30.00c; monel- l, 29.00c.

apes

uctural Shapes: Pittsburgh, Chicago, Gary, mingham, Buffalo, Bethlehem, 2.50c; New k, del., 2.70c; Phila., del., 2.64c; Geneva, h (base, del), 2.675c; Los Angeles (base,), 3.17c-3.41c; Los Angeles and San Fran- o (sizes produced at Geneva only), del., ic; Kaiser, del., San Francisco, 3.41c. oenix Iron Co., Phoenixville, Pa., nominally, c, fob Phoenixville.)

el Piling: Pittsburgh, Chicago, Buffalo, $3 100 lb.

ire and Wire Products

b Pittsburgh, Chicago, Cleveland and Birgham per 100 pounds).

e to Manufacturers in carloads

ght, basic or bessemer.....*$3.30–$3.55
ng (except Birmingham).....**$4.25

e Products to Trade

ls and Staples

ndard and cement-coated.....†$3.75–$4.50
vanized .....‡$3.75–$4.50

e, Merchant Quality

ealed (6 to 8 base) $3.95
vanized (6 to 8 base)..... $4.40

b Pittsburgh, Chicago, Birmingham, per e column)

ven fence, 15 gage and heavier.... ††84
bed wire, 80-rod spool..... ††94
bless wire, twisted..... 94
ce posts (no clamps)..... ††90
e ties, single loop..... ††86

Worcester, $3.40, Duluth, $3.35, base. San ncisco (base, del.) $4.31 for bright basic

Worcester $4.35, Duluth and Trenton, N. $4.50, base. San Francisco (base, del.) 3 for MB spring wire; $5.28 black premier. Worcester $4.05, Cleveland $3.85, base. San ncisco (base, del.) $4.83.

Duluth $3.75, Cleveland $3.85, base. San ncisco (base, del.) $4.83.

Worcester $4.05, annealed; $4.50, galvan- Duluth $3.95, annealed; $4.40, galvanized . San Francisco (base, del.) $4.96, an- ed; $5.41, galvanized.

San Francisco (base, del.): Woven fence, barbed wire, 114; bale ties, 110. Duluth e): Woven fence, 84; barbed wire, 94; fence s, 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.50 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $2.85 per 100 lb; light rails (rail steel), Williamsport, Pa., $3.20, Pittsburgh, $2.85. Relaying, 60 lb and over fob warehouse $45-$47 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill; $3.15 base, Seattle. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	23	½	— 2	+20
¼ & ⅜	51	30½	¾	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless Steel

In.	Blk.	Gal	In.	Blk.	Gal
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Elec. Weld— Hot Rolled	Cold Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	48 off
⅝ and ⅝ x 6-in. and shorter	50 off
Larger diameter; longer than 6 in.	47 off
Tire bolts	38 off
Step bolts	46 off
Plow bolts	57 off
Lag bolts	
¼ in. up to 1 in., 6 in. and shorter	50 off
¼ in. up to 1 in., longer than 6 in.	48 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller	51 off	....
½-in. and smaller	....	50 off
½-in.-1-in.	48 off	....
⅝-in.-1-in.	....	49 off
1⅛-in.-1½-in.	46 off	47 off
1⅝-in. and larger	....	40 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright)	56 off
Upset (10-35 heat treated)	
⅝ x 6	51 off
¾, ⅞, & 1 x 6	47 off

Square Head Set Screws

Upset 1-in. and smaller	61 off
Headless, ¼-in. and larger	46 off
No. 10 and smaller	56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham

Structural	5.25c
Lebanon, Pa.	5.40c
⅞-in. and under	.55-5 off
Lebanon, Pa.	.55-5 off plus 15c per cwt.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per bbl; reg. carbon 16.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	74.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	62.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.50	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	33.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442	24.50	28.00	35.50	26.00	35.00
443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
*501	9.00	13.00	17.50	13.00	18.50
*502	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax

PIG IRON

Prices per gross ton	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$34.50	$34.00	$35.50	$35.00
Newark, N. J., del.	36.34	35.84	37.34	36.84
Brooklyn, N. Y., del.	37.50	....	....	38.00
Philadelphia, del.	....	35.72	....	....
Birdsboro, Pa., base	40.50	40.00	41.50	41.00
Birmingham, base	29.88	29.38	34.50	....
Baltimore, del.	36.28	....	....	....
Chicago, del.	34.12	....	....	....
Cincinnati, del.	34.75	34.25	....	....
Newark, N. J., del.	35.96	....	....	....
Philadelphia, del.	35.13	....	....	....
St. Louis, del.	33.87	33.37	....	....
Buffalo, base	33.00	32.50	34.00	33.50
Boston, del.	39.48	38.98	40.48	39.98
Rochester, del.	34.84	34.34	35.84	35.34
Syracuse, del.	35.50	35.00	36.50	36.00
Chicago, base	33.00	32.50	34.00	33.50
Milwaukee, del.	34.32	33.82	35.32	34.83
Muskegon, Mich., del.	36.83	....	....	37.33
Cleveland, fob furnace	33.00	32.50	34.00	33.50
Akron, del.	35.17	34.17	35.67	35.17
Duluth, base	33.50	33.00	34.50	34.00
Erie, Pa., base	33.00	32.50	34.00	33.50
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	33.50	33.00	....	33.50
St. Louis, del.	34.25	33.75	....	34.25
†**Neville Island, Pa.,** base	33.50	33.00	34.00	33.50
Pittsburgh, del., N. & S. Sides	34.33	33.83	34.83	34.33
Provo, Utah, base	33.50	33.00	....	....
Seattle, Tacoma, Wash., del.	38.60	....	....	....
Portland, Oreg., del.	38.60	....	....	....
Sharpsville, Pa., base	33.50	33.00	34.00	33.50
Steelton, Pa., base	34.50	34.00	35.50	35.00
Swedeland, Pa., base	35.50	....	36.50	36.00
Philadelphia, del.	36.54	....	37.54	37.04
Troy, N. Y., base	34.50	34.00	35.50	35.00
Toledo, O., base	33.00	32.50	34.00	33.50
Cincinnati, del.	36.50	36.00	....	....
Youngstown, O., base	33.50	33.00	34.00	33.50
Mansfield, O.	36.48	35.98	36.98	36.48

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Oakmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of Sharpsville, Pa., basing point price for No. 2 foundry, basic, bessemer and malleable pig iron.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base)	$42.50		
6.51-7.00	$43.50	9.01- 9.50	48.50
7.01-7.50	44.50	9.51-10.00	49.50
7.51-8.00	45.50	10.01-10.50	50.50
8.01-8.50	46.50	10.51-11.00	51.50
8.51-9.00	47.50	11.01-11.50	52.50

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever basis is more favorable.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron: Si 14.01-14.50%, $61.75, Jackson, O.; $65, Niagara Falls; $66, piglets, $64, open-hearth and foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn....$43.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $33.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $39; Birdsboro, Pa., $45, base; Philadelphia, $41.22, del. Intermediate phosphorus, Central furnace, Cleveland, $36.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$9.50–$10.50
Connellsville, foundry	9.75–12.00
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

* Operators of hand-drawn ovens using trucked coal, $10.10-$11.10.

Foundry Coke

Kearney, N. J., ovens	$15.35
Chicago, outside del.	15.10
Chicago, del.	16.10
Terre Haute, del.	15.60
Milwaukee, ovens	15.85
New England, del.	17.25
Birmingham, Del.	13.25
Indianapolis, ovens	14.50
Cincinnati, del.	15.35
Ironton, O., ovens	13.35
Painesville, ovens	14.60
Cleveland, del.	15.90
Buffalo, del.	16.10
Detroit, del.	15.75
Philadelphia, ovens	15.50
Swedeland, Pa., ovens	15.50
Portsmouth, O., ovens	14.00
Fairmont, W. Va., ovens	13.75
Pittsburgh, del.	15.61

Coal Chemicals

Spot, gal, freight allowed east of Omaha. Effective as of Apr. 1, 1947

Pure and 90% benzol	19.00c
Toluol, two degrees	23.00c
Industrial xylol	23.00c
Solvent naphtha	26.00c

Per pound fob works

Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "house-hold use"	9.50c

Per ton, bulk, fob plants

Sulphate of ammonia	$30.00

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	76.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low Heat Duty

Pa., Md., Ohio	56.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Malleable Bung Brick

All bases	80.0

Silica Brick

Pennsylvania	70.0
Joliet, E. Chicago	79.0
Birmingham, Ala.	70.0

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	24.0
Single bags	28.0

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.0
Chem. bonded chrome	59.0
Magnesite brick	81.0
Chem. bonded magnesite	70.0

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.9
Old range nonbessemer	5.8
Mesabi bessemer	5.7
Mesabi nonbessemer	5.5
High phosphorus	5.5

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	15.2

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom
Swedish basic, 60 to 68%	13.5
Spanish, No. African basic, 50 to 60%	Nom
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50–6.5

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$32–$3

Manganese Ore

46-50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 63.00c-67.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.5
48% 3:1	39.0
48% no ratio	31.0
South African (Transvaal)	
44% no ratio	$27-$27.5
45% no ratio	28.0
48% no ratio	30.0
50% no ratio	31.0
Brazilian—nominal	
44% 2.5:1 lump	$33.6
48% 3:1 lump	43.5
Rhodesian	
45% no ratio	$27-$27.5
48% no ratio	30.0
48% 3:1 lump	39.0
Domestic (seller's nearest rail)	
48% 3:1	$39.6

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.*

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF₂ content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60% $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.85	3.85	3.85	3.85	3.85	3.85	...	...	...
Cold-Rolled	4.75	4.75	4.75	4.75	...	4.75	...	...	...
Galvanized	5.40	...	...	...	...	.....	...	...	...
Strip, Hot-Rolled	3.85	3.85	3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	...	4.00	4.00

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	†C-R	H-R Rds. ⅜" to 3"	C-F Rds. ½"& up	H-R Alloy (§4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ⅜" & Thicker
oston (City)	4.50	5.67[4]	5.22[4]	5.55[4]	6.80[4]	4.65	6.36	4.62	5.22	7.12	4.47	4.70	6.42
New York (city)	4.42	....	5.27[8]	5.47[5]	....	4.62	....	4.62	5.17	8.42[12]	4.37	4.72	6.35
ew York (country)	4.32	....	5.17[8]	5.37[5]	....	4.52	....	4.52	....	....	4.27	....	6.25
hiladelphia (city)	4.34	5.73[9]	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.13	6.87	4.22	4.44	5.93
hiladelphia (country)	4.24	5.63[9]	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.34	5.83
altimore (city)	3.99†	5.50[8]†	5.20[8]†	5.14[5]	6.39[5]	4.40	....	4.45	5.10	....	4.34	4.39	5.90
altimore (country)	3.89†	5.40[8]†	5.10[8]†	....	....	....	....	....	....	....	4.24	4.29	5.80
Vashington (city)	4.35	....	....	5.18[5]	6.43[5]	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
orfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
uffalo (city)	4.15	....	4.85[6]	5.35[6]	....	4.30	5.25	4.10	4.75	....	4.10	4.55	5.90
uffalo (country)	4.00	....	4.70[6]	4.95[5]	....	3.90	4.85	3.95	4.60	6.60	3.95	4.10	5.45
ttsburgh (city)	3.95†	...	4.75[8]†	5.10[6]	6.35[6]	4.05	5.00	4.10	4.75	6.60	4.10	4.25	5.60
ttsburgh (country)	3.80†	....	4.60[8]†	4.95[6]	6.20[6]	3.90	4.85	3.95	4.60	6.60	3.95	4.10	5.45
oungstown, O. (city)	4.188	5.338	4.888	5.05	6.30	4.00	....	4.238	5.138	....	4.218	4.488	5.178
oungstown, O. (country)	...	....	....	4.95	6.20	3.90	....	....	....	....	....	....	...
etroit	4.05	5.30	4.85‡	5.42	6.67	4.34	5.24	4.20	4.87[12]	7.01	4.42	4.49	5.92
eveland (city)	4.15	5.15[8]	4.85[8]	5.238[5]	6.488[5]	4.188	5.10	4.10	4.75	6.858	4.311	4.25	5.961
eveland (country)	4.00	5.00[8]	4.70[8]	....	....	3.90	4.95	3.95	4.60	....	....	4.10	....
ncinnati	4.016	4.816[8]	....	5.166[5]	6.416[5]	4.394	....	4.403	5.053	....	4.444	4.553	5.944
icago (city)	4.15	5.15[8]	4.85[8]	5.10[6]	6.35[6]	4.05	5.10	4.10	4.75	6.60[12]	4.10	4.25	5.75
icago (country)	4.00	5.00[8]	4.70[8]	4.95[6]	6.20[6]	3.90	4.95	3.95	4.60	6.60[12]	3.95	4.10	5.60
lwaukee	4.299	5.299[8]	4.999[8]	5.249[5]	6.499[5]	4.199	5.249	4.249	4.899	6.899	4.249	4.399	5.899
Paul, Minneapolis	4.284[13]	....	5.084[8]†	5.434[5]	6.684[5]	4.384[12]	....	4.434[13]	5.476[11]	7.084[11]	4.434[13]	4.584[13]	6.084[13]
dianapolis	4.04	...	4.84[8]	5.29[5]	6.54[5]	4.24	....	4.36‡‡	5.26	....	4.36	4.61	6.01
Louis	4.699	....	4.899[8]†	5.424[5]	6.674[5]	4.199	....	4.249	5.074[12]	7.074	4.249	3.999	5.899
rmingham (city)	4.15[20]	....	....	5.25[6]	...	4.15[20]	....	4.15[20]	5.58	....	4.15	4.35	6.56
rmingham (country)	4.00[20]	....	....	5.10[6]	....	4.00[20]	....	3.95[20]	....	....	3.95	4.20	
ew Orleans	4.68[20]°°	.	5.94[8]			4.88[20]	....	4.83[20]°°	5.94[11]	....	4.73[20]°°	5.03[20]	6.99[20]
ouston, Tex.	6.00[1]	...	...	6.00	....	6.00[1]	....	5.35[1]	....	6.35	5.85	5.85	6.40
maha, Nebr.	4.968	....	...	5.918[5]	7.168[5]	4.868	....	4.918	5.568[11]	....	4.918	5.068	6.568
os Angeles	5.35	...	7.00[8]	....	7.45[5]	5.65	8.35	5.10	6.90[19]	9.35	5.20	5.10	7.20
n Francisco	4.90[21]	....	6.30[5]		7.35[5]	5.20[14]	8.35[14]	4.75[14]	°°°	9.35[10]	4.90[14]	5.00[14]	6.80[14]
attle and Tacoma, Wash.	5.00[17]	...	6.75[8]	6.30[5]	..	5.30[17]	....	5.00[17]	7.10[19]	8.50[12]	4.95[17]	5.15[17]	7.25[17]

se Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 pounds and over; [1]—any antity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to e bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; —400 to 14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 4999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; —1500 to 39,999; [20]—400 to 9999 pounds; [21]—400 lb and over.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § as rolled. except New rk, Jersey City, Indianapolis and San Francisco where price represents annealed bars; °° add 0.46 for sizes not rolled in Birmingham; †† same prices oted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier; °°° rounds under ⅜ in. 7.00c, ⅜ in. and over 50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c at San Francisco.

PRICES OF LEADING FERROALLOYS PRODUCTS

legeleisen: 19-21% Mn, 1-3% Si, lot per gross ton, Palmerton, Pa., 4, Pittsburgh, $48. 16% to 19% n, Pittsburgh, $47.

rromanganese, standard: 78-82% gross ton, duty paid, $135 fob rs, Baltimore, Philadelphia or w York, whichever is most favor- le to buyer, Birmingham, Ala. here Sloss-Sheffield Steel & Iron is producer); $140.25 fob cars, tsburgh, including 75c switching rge, (where Carnegie-Illinois Steel rp. is producer); add $8 for ked c.l., $10 for ton, $13.50 for s ton; $1.70 for each 1%, or ction contained manganese over % or under 78%.

rromanganese, low carbon: East- zone: Special, 21c; regular, 50c; medium, 14.50c; central n e: Special, 21.30c; regular, 80c; medium, 14.80c; western n e: Special, 21.30c; regular, 20c; medium, 15.20c. Prices are pound contained Mn, bulk carlot pments, fob shipping point, ght allowed. Special low-carbon content of 90% Mn, 0.10% C, 0.06% P.

rromanganese Briquets: (Weight rox. 3 lb and containing exactly Mn) Prices per lb of briquets: ntract, bulk, carlots, 7.00c, ked, carlots, 7.60c, ton lots, 0c, smaller lots 8.40c, eastern, ght allowed; 7.25c, 7.85c, 8.60c 9.00c, central; 7.80c, 8.40c, 60c and 10.90c, western; spot up 5c; notched, up 0.25c.

rotungsten: Spot, 10,000 lb or re, per lb contained W, $2.27; ntract, $2.25; freight allowed as west as St. Louis.

rotitanium: 40-45%, R.R. freight wed, per lb contained Ti; ton $1.23; smaller lots $1.25; east- Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; smaller lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

Ferrovanadium: V 0.35-0.55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 13.80c, ton lots 14.30c, smaller lots 14.80c; 75%, c.l. 11.05c, ton lots 11.65c, smaller lots 12.25c; 50%, c.l. 9.00c, ton lots 9.65c, smaller lots 10.30c. Deduct 1.00c for bulk, carlots, 80-90% and 90-95%; 1.05c, 75%; 1.20c, 50%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, smaller lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; smaller lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots. **High carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c. **Low carbon,** eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22.00c, 0.2% 21.75c; 0.5% 21.50c, 1% 21.00c, 2% 20.50c; add 1.35c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l.; and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carlot packed differential 0.80c. Prices are per lb of contained Cr, freight allowed.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, smaller lots 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, smaller lots 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 21.00c; packed carlot 21.80c, ton lots 22.35c, smaller lots 23.35c, eastern, freight allowed, per pound of contained Cr; 21.40c, 22.20c, 23.00c, and 24.00c, central; 21.50c, 22.30c, 24.20c and 25.20c, western spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, smaller lots 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). per lb of alloy. Contract, carlots, packed, 16.10c, ton lots 17.60c, smaller lots 18.60c, eastern, freight

allowed; 16.60c, 18.45c, 19.45c, central; 18.65c, 20.20c, 21.20c, western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb of alloy. Contract, lump, packed, carlots 14.60c, ton lots 16.10c, smaller lots 17.10c, eastern, freight allowed; 15.10c, 16.85c, 17.85c, central; 17.15c, 19.00c, 20.00c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 14.50c; 2000 lb to c.l. 16.00c; central zone, 15.10c and 18.25c; western, 15.70c and 20.00c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l., 14.10c; 2000 lb to c.l. 15.60c; central, 14.70c and 17.85c; western, 15.30c and 19.60c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese Briquets: Containing exactly 2 lb Mn and about ½ lb Si, eastern zone, bulk, c.l. 6.75c, ton lots 7.75c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c..

Silicon Briquets: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.70c, ton lots 5.10c, smaller lots 5.50c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.85c, ton lots 5.25c, smaller lots 5.65c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn., max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy: Contract, 5 tons or more $1.90, 1 ton to 5 tons $2.00, smaller lots $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, smaller lots 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Price per lb of alloy, contract, carlots 13.50c, ton lots 14.25c, smaller lots 15.00c, eastern zone, freight allowed; 13.80c, 15.35c, 16.10c, central; 13.80c, 17.30c, 18.05c, western; spot up 0.25c.

CMSZ Alloys 4 & 5: (Alloy 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3.00-4.50%; alloy 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%). Prices per lb of alloy, contract or spot, bulk, carlots 14.50c; packed, carlots 15.25c, ton lots 16.00c, smaller lots 16.75c, eastern, freight allowed; 14.80c, 15.55, 17.10c, 17.85c, central; 14.80, 15.55c, 19.05c, 19.80c, western.

Zirconium alloy: 12-15%, per lb alloy, eastern, contract, bulk, ca lots 5.50c, packed, carlots 6.05 ton lots 6.40c, smaller lots 6.75 spot up 0.25c.

Zirconium alloy: Z 35-40%, easter contract, packed, carlots 17.00c, t lots 17.75c, smaller lots 19.00c; sp up 0.25c.

Alsifer: (Approx. 20% Al, 40% S 40% Fe) Contract basis fob N agara Falls, N. Y., lump per 6.25c; ton lots 6.75c; smaller lo 7.25c. Spot up ½c.

Simanal: (Approx. 20% each S Mn, Al) Packed, lump, carload 9 ton lots 9.25c, smaller lots 9.75c p lb alloy; freight not exceeding S Louis rate allowed

Tungsten Metal Powder: Spot, n less than 98.8%, $2.90, freight a lowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 87.5c; No. 6, 60c; No. 79, 45c; a fob Bridgeville, Pa., usual freig allowance.

Vanadium Pentoxide, technica grade: Fused, approx. 89-92% V_2O_5 and 5.84% Na_2O; or air dried, 8 85% V_2O_5 and 5.15% Na_2O, $1.1 per lb contained V_2O_5 fob pla freight allowed on quantities of 2 lb and over to St. Louis.

Renewal of Premium Metal Plan Delayed

Congress expected to enact continuing legislation by mid-July . . . Silver prices tend upward

NEW YORK—Premium Price Plan for copper, lead and zinc expired at the close of last month, no continuing legislation having been passed by Congress. However, it was believed that the Department of Commerce would find a way to administer the plan during the lapse of the law. Consideration of the Hill bill to extend the premium payment plan without any change to June 30, 1948, is expected within the next week or ten days. It was believed that the delay was due to the desire to give the problem of the small producers of these metals further study before enacting long range legislation.

American Zinc & Chemical Co. plans to close its Langeloth, Pa., plant soon, according to B. N. Zimmer, president, due to obsolete processes used there in the production of nonferrous metals. The plant will continue to operate for some time so that current supplies of raw materials can be converted. Operations will be cut back this month and will be gradually curtailed until completely halted during the final quarter of 1947.

COPPER—Sales of copper in the domestic market were light last week due to the sold-out position of sellers for July delivery. August books will not be opened generally until today and will be filled as rapidly as sellers care to make commitments. Undertone of the market remains firm on the basis of 21.50c, delivered Connecticut Valley.

BRASS and BRONZE INGOTS: Shipments of brass and bronze ingots declined about 5000 tons in May to a total of 19,525 tons. This brought total deliveries to consumers for the first five months to 124,106 tons compared with 141,016 tons in the like 1946 period, a decline of 12 per cent. Deliveries in May were the smallest in nearly six years, or since September, 1941, when they amounted to 16,388 tons. New orders in June declined further. No improvement is noted in activity of the principal consuming industries, including the building trades, indicating that deliveries likely will continue the downtrend toward prewar levels.

LEAD—Supply of lead continues tight with sellers disposing of available tonnages readily. Practically no metal remains for July delivery from primary producers and secondary smelters, although other sources will supply a fair tonnage. Office of Metals Reserve is expected to release about 3500 tons from the government's stockpile, which would leave only about the same amount for subsequent delivery. In addition, tonnages of lead which were brought in from Japan last year may be released. Imports of pig lead from Japan in 1946 amounted to 12,126 tons.

Undertone of the market remained firm on the basis of 14.80c to 14.85c, St. Louis, for the common grade and 14.90c for chemical and corroding grades.

SECONDARY LEAD—Receipts of lead-base scrap at secondary smelters' plants did not exceed previous records during March, but consumption and the resultant secondary metal recovery reached a new peak, according to the Bureau of Mines. Recovery of lead, tin and antimony from both lead-base and tin-base scrap for the first quarter of this year exceeded that for the first quarter of last year by over 35,000 tons.

ZINC—Treasury Department has been unable to purchase zinc for stockpiling purposes below the current, open-market level which that agency considers too high. According to reliable trade reports, government officials have had the erroneous opinion that the market was weak and that purchases of surplus zinc could be obtained at price concessions. However, producers are still disposing all of current output at the firmly established price level of 10.50c, Eas St. Louis, for prime western.

Average daily rate of zinc productio from domestic mines in April advance to the highest level since August, 194 according to the Bureau of Mines. Apr zinc output, in terms of recoverabl metal, was 56,510 short tons, an ave age of 1884 tons per day compared wit 55,134 tons in March produced at a average rate of 1779 tons per day.

TIN—Prices held unchanged la week on the basis of 80.00c, New Yor as Congress passed an interim extensio of controls until July 15, 1947. It expected that by that time continuin legislation will be passed.

The government's authority to operat the government-owned tin smelter Texas City, Tex., has been extended b Congress for another two years. It ex tends the powers, functions, duties an authority of the United States hereto fore exercised by the Reconstructio Finance Corp., to buy, sell, and tran port tin, tin ore and concentrates; t improve, develop, maintain, and op erate by lease or otherwise the t smelter; to finance research in tin smel ing and processing; and, to do all thing necessary to accomplish all this.

SILVER—Price of foreign silv moved steadily higher during the ear part of last week, with sales reported 64.00c compared with the year's low 60.00c. Demand came principally fro American industrial users. Makers silver products are closing down for t workers' general vacation periods a it is believed recent buying is to provi ample supplies when plants resume pr duction a few weeks hence.

A strengthening factor in silver de ings in New York has been the Ba of Mexico's contract with Mexican pr ducers to take 2 million ounces, roughly half their July output for coi age purposes. So far, the Bank of Me ico has confined its silver purchases July output and there has been no in cation as to purchases in subsequ months.

NONFERROUS METAL PRICES

opper: Electrolytic, carlots 21.50c, delivered onn.; Lake, 21.62½c, del. Conn. Dealers ay add ¾c for 5000 lb to carload; 1c, 1000-999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, m., refinery, 20,000 lb or more; nom., less an 20,000 lb.

rass Ingot: 85-5-5-5 (No. 115) 18.00c; 88-10-2 No. 215) 26.25c; 80-10-10 (No. 305) 22.00c; o. 1 yellow (No. 405) 14.50c; carlot prices, ncluding 25c per 100 lb freight allowance; add c for less than carloads.

inc: Prime western 10.50c, brass special 0.75c, intermediate 11.00c, E. St. Louis; high rade 11.50c, del., carlots. For 20,000 lb to arlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-0,000 lb 0.4c; under 2000 lb 0.50c.

ead: Common 14.80c-14.85c, chemical 14.90c, orroding 14.90c, E. St. Louis for carlots.

rimary Aluminum: 99% plus, ingots 15.00c el., pigs 14.00c del.; metallurgical 94% min. 3.50c del. Base 10,000 lb and over; add ½c 000-9999 lb; 1c less through 2000 lb.

econdary Aluminum: Piston alloy (No. 122 ype) 13.75c; No. 12 foundry alloy (No. 2 rade) 13.25c; steel deoxidizing grades, notch ars, granulated or shot: Grade 1 (95-97½%) 4.50c; grade 2 (92-95%) 12.50c; grade 3 90-92%) 11.75c; grade 4 (85-90%) 11.00c. bove prices for 30,000 lb or more; add ¼c 0,000-30,000 lb; ½c 5000-10,000 lb; ¾c 000-5000 lb; 1¼c less than 1000 lb. Prices nclude freight at carload rate up to 75c per 00 lb.

lagnesium: Commercially pure (99.8%) stand-rd ingots (4-notch, about 20 lb), 10,000 lb and ver, 20.50c; 2000 to 9999 lb, 21.50c; 100 to 999 lb, 22.50c. Extruded rounds, 12 inches ong, 1.312 inches in diameter, less than 25 lb, 2.00c-56.00c; 25 to 99 lb, 42.00c-46.00c; 100 o 4000 lb, 35.00c-36.00c.

in: Prices ex-dock, New York in 5-ton lots. dd 1 cent for 2240-11,199 lb, 1½c 1000-2239, ½c 500-999, 3c under 500. Grade A, 99.8% r higher (includes Straits), 80.00c; Grade , 99.8% or higher, not meeting specifications or Grade A, with 0.05% max. arsenic, 79.85c; rade C, 99.65-99.79% incl. 79.55c; Grade D, 9.50-99.64% incl., 79.40c; Grade E, 99-99.49% ncl. 78.90c; Grade F, below 99% (for tin con-ent), 78.70c.

ntimony: American bulk carlots fob Laredo, ex., 99.0% to 99.8% and 99.8% and over but ot meeting specifications below, 33.00c; 99.8% nd over (arsenic, 0.05% max.; other impuri-es, 0.1% max.) 33.50c, effective as of Mar. 5. On producers' sales add ¼c for less than arload to 10,000 lb; ½c for 9999-224 lb; add 2c or 223 lb and less; on sales by dealers, dis-ributors, and jobbers add ½c, 1c, and 3c, espectively.

ickel: Electrolytic cathodes, 99.9%, base sizes t refinery, unpacked 35c lb; 25 lb pigs pro-uced from electrolytic cathodes 36.50c lb; shot roduced from electrolytic cathodes 37.50c lb; F" nickel shots or ingots for additions to cast on 35.50c lb. Prices include import duty.

ercury: Open market, spot, New York, $84-37 per 76-lb flask.

rsenic: Prime, white, 99%, carlots, 4.00c lb.

eryllium-Copper: 3.75-4.25% Be, $14.75 per contained Be.

admium: Bars, ingots, pencils, pigs, plates, ods, slabs, sticks, and all other "regular" raight or flat forms $1.75 lb, del.; anodes, alls, discs and all other special or patented apes, $1.80.

obalt: 97-98%, $1.65 lb for 550 lb (keg); 1.67 lb for 100 lb (case); $1.72 lb under 100

old: U. S. Treasury, $35 per ounce.

ridium: 99.9%, $2.25 per troy ounce.

ilver: Open market, N. Y., 64.00c, per ounce.

latinum: $53-$56 per ounce.

alladium: $24 per troy ounce.

hodium: $80-$90 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 21.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 33.68c; yellow brass 29.63c; commercial bronze, 95% 33.72c, 90% 33.11c, red brass, 85% 31.99c, 80% 31.38c; best quality 30.64c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 38.44c; nickel silver, 18%, 42.49c; phosphor bronze, grade A, 5%, 52.00c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.39c; commercial bronze, 95% 33.41c, 90% 32.80c; red brass, 85% 31.68c, 80% 31.07c; best quality 30.33c.

Seamless Tubing: Copper 33.72c; yellow brass 32.39c; commercial bronze 90% 35.52c; red brass 85% 34.65c, 80% 34.04c; best quality brass 33.05c.

Wire: Yellow brass 29.92c; commercial bronze, 95% 34.01c, 90% 33.40c; red brass, 85% 32.28c, 80% 31.67c; best quality brass 30.93c.

Copper Wire: Bare, soft, fob eastern mills, carlots 27.72c, less carlots 28.22c; weatherproof, fob eastern mills carlots 28.12c, less carlots 28.62c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88c.

Aluminum Sheets and Circles: 2s and 3s flats, mill finish, base 30,000 lb or more, fob shipping point. Actual transportation charges (not to exceed lowest carload rail freight rate) are deducted on orders for domestic delivery of 500 lb or more of one product to one destination. Widths from 12 in. and diameters from 9 in. to indicated maximum sizes. Prices, cents per lb, effective Jan. 30, 1947.

B. & S. Gage	Max. Width or Diam.	Sheet Base	Circle Base
0.0249"-7	48"	23.70	26.20
8-10	48"	24.20	26.70
11-12	26"	24.70	27.50
13-14	26"	24.90	27.90
15-16	26"	25.10	28.20
17-18	26"	25.40	28.60
19-20	24"	25.70	29.00
21-22	24"	26.10	29.50
23-24	24"	26.60	30.20
25	24"	27.10	30.90
26	24"	27.80	31.90
27	24"	28.50	33.00
28	24"	29.20	33.70
29	24"	30.00	34.70
30	24"	30.80	35.80

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq. ft; 75c, 10 to 20 sq ft and circles. Pipe: Full coils 17.50c; cut coils 17.75c. Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 21.00c; 5 tons and over 21.50c; 1 to 5 tons, 22.00c; less than 1 ton, 22.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 29.84c; oval, 29.34c; electro-deposited, 29.09c; cast, 28.84c.

Copper Carbonate: 52-54% metallic Cu, 50 lb bags, 26.50c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 3000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 20.00c.

Tin Anodes: Bar, 1000 lb and over 92.50c; 500 to 1000 lb, 93.00c; 200 to 500 lb, 93.50c; less than 200 lb, 94.00c; ball, 1000 lb and over, 94.75c; 500 to 1000 lb, 95.25c; 200 to 500 lb, 95.75c; less than 200 lb, 96.25c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., 60.00c; 100 lb kegs, 60.50c.

Sodium Stannate: To all consumers: in 200 or 500 lb drums, 49.50c; 100 lb, 50.50c; 50 lb, 55.00c; 25 lb, 57.00c.
To consumers other than automobile, radio and refrigerator makers: 1500 lb, 45.85c; 600 to 1400 lb, 48.50c.
To automobile, radio and refrigerator makers: 10,000 lb and over, 44.50c; 2000 to 9999 lb 45.50c; 1000 to 1999, 46.50c; 600 to 9999 lb, 48.50c.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland; 35.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)

Prices for less than 15,000 lb fob shipping point. Add ⅝c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.063
Phos. bronze, A. B.	20.000	19.750	18.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 15.50, No. 2 copper 14.00, light copper 13.50, composition red brass 13.25, auto radiators 10.00, heavy yellow brass 9.00, brass pipe 9.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 17.00; No. 2 copper, 15.50, light copper, 14.50; refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 13.62½.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.00-15.50, No. 2 13.75-14.00, light copper 12.50-13.00; No. 1 composition red brass 11.00-11.50, No. 1 composition turnings 10.00-10.50, mixed brass turnings 5.50-6.00, new brass clippings 12.00-12.50, No. 1 brass rod turnings 10.50-11.00, light brass 4.75-5.00, heavy yellow brass 6.50-7.00, new brass rod ends 11.00-11.50, auto radiators, unsweated 8.50-8.75, cocks and faucets 8.50-9.00, brass pipe 8.25-8.50.

Lead: Heavy lead 10.50-11.00, battery plates 6.00-6.25, linotype and stereotype 12.25-12.50, electrotype 10.75-11.00, mixed babbitt 11.00-11.50, solder joints 15.50-16.00.

Zinc: Old zinc 5.00-5.50, new die cast scrap 3.75-4.00, old die cast scrap 2.00-2.50.

Tin: No. 1 pewter 50.00-52.00, block tin pipe 67.00-68.00, auto babbitt 40.00-42.00, No. 1 babbitt 40.00-43.00, siphon tops 40.00-42.00.

Aluminum: Clippings, 2S, 8.00-8.50, old sheets 5.00-5.50, crankcase 4.00-4.50, borings and turnings 2.00, pistons, free of struts, 4.00-4.50.

Nickel: Anodes 18.50-19.00, turnings 15.50-16.50, rod ends 18.00-19.00.

Monel: Clippings 13.00-14.00, turnings 7.50-8.00, old sheet 11.00-12.00, rods 11.50-12.50, castings 9.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 2 Heavy Melt. Steel	34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1, 2 & 3 Bundles.	34.50-35.00
Machine Shop Turnings	29.50-30.00
Mixed Borings, Turnings	29.50-30.00
Short Shovel Turnings.	31.50-32.00
Cast Iron Borings	30.50-31.00
Bar Crops and Plate	39.00-40.00
Low Phos. Cast Steel	39.00-40.00
Punchings & Plate Scrap	39.00-40.00
Cut Structurals	39.00-40.00
Elec. Furnace Bundles.	39.00-40.00
Heavy Turnings	31.00-31.50
No. 1 Chemical Borings	31.00-32.00

Cast Iron Grades

No. 1 Cupola	40.00-41.00
Charging Box Cast	35.00-35.50
Heavy Breakable Cast.	34.00-34.50
Stove Plate	37.50-38.00
Unstripped Motor Blocks	37.50-38.00
Malleable	44.50-45.00
Brake Shoes	35.00-36.00
Clean Auto Cast	40.00-41.00
No. 1 Wheels	42.00-42.50
Burnt Cast	35.00-36.00

Railroad Scrap*

No. 1 R.R. Heavy Melt.	38.50-38.66
R.R. Malleable	44.50-45.00
Axles	40.00-41.00
Rails, Rerolling	37.00-37.50
Rails, Random Lengths	35.00-36.00
Rails, 3 ft and under.	39.00-39.50
Rails, 18 in. and under.	41.00-41.50
Railroad Specialties	43.00-43.50
Uncut Tires	38.00-39.00
Angles, Splice Bars	38.00-38.50

* Brokers buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$33.50-34.00
No. 2 Heavy Melt. Steel	33.50-34.00
No. 1 Busheling	33.50-34.00
Nos. 1 & 2 Bundles	33.50-34.00
Machine Shop Turnings.	28.00-29.00
Mixed Borings, Turnings	29.00-30.00
Short Shovel Turnings.	29.00-30.00
Cast Iron Borings	28.00-29.00
Bar Crops and Plate	35.50-37.00
Cast Steel	35.50-37.00
Punchings & Plate Scrap	35.50-37.00
Elec. Furnace Bundles.	33.50-35.00
Heavy Turnings	32.00-33.50
Alloy Free Turnings	29.50-30.00
Cut Structurals	37.50-38.00

Cast Iron Grades

No. 1 Cupola	44.50-45 50
Charging Box Cast	38.00-40.00
Stove Plate	38.00-40.00
Heavy Breakable Cast.	38.00-40.00
Unstripped Motor Blocks	41.00-42.00
Malleable	52.00-55.00
Brake Shoes	42.00
Clean Auto Cast	45.00
No. 1 Wheels	42.00
Burnt Cast	38.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00-37.00
R.R. Malleable	52.00-55.00
Rails, Rerolling	40.00-41.00
Rails, Random Lengths	41.00-43.00
Rails, 3 ft and under.	45.00
Railroad Specialties	44.00
Uncut Tires	42.00
Angles, Splice Bars	45.00

VALLEY

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Bundles	35.00
Machine Shop Turnings.	27.00
Short Shovel Turnings.	28.00-30.00
Cast Iron Borings	28.50-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00-37.00

MANSFIELD

No. 1 Heavy Melt. Steel	$33.00-34.50
Machine Shop Turnings.	27.00
Short Shovel Turnings.	29.00

CINCINNATI

No. 1 Heavy Melt. Steel	$32.00
No. 2 Heavy Melt. Steel	32.00
No. 1 Busheling	32.00
No. 1 Bundles	32.00
No. 2 Bundles	32.00
Machine Shop Turnings	26.00
Mixed Borings, Turnings	25.00
Short Shovel Turnings.	28.00
Cast Iron Borings	27.00

Cast Iron Grades

No. 1 Cupola Cast	43.00
Charging Box Cast	35.00
Heavy Breakable Cast.	36.50
Stove Plate	33.00
Unstripped Motor Blocks	35.00
Brake Shoes	32.00
Clean Auto Cast	42.00
Drop Broken Cast	45.50

Railroad Scrap

No. 1 R.R. Heavy Melt	36.00
R.R. Malleable	49.00
Rails, Rerolling	40.00
Rails, Random Lengths	40.00
Rails, 18 in. and under	45.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$29.50-30.00
No. 1 Busheling	29.50-30.00
Nos. 1 & 2 Bundles	29.50-30.00
No. 3 Bundles	29.50-30.00
Machine Shop Turnings	23.50-24.00
Mixed Borings, Turnings	23.50-24.00
Short Shovel Turnings.	25.00-25.50
Cast Iron Borings	25.00-25.50
Punchings & Plate Scrap	33.00-33.50

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast.	25.00-27.00
Clean Auto Cast	33.00-34.00

BUFFALO

No. 1 Heavy Melt. Steel	$33.00-34.00
No. 2 Heavy Melt. Steel	33.00-34.00
No. 1 Busheling	33.00-34.00
Nos. 1 & 2 Bundles	33.00-34.00
Machine Shop Turnings	23.50-24.00
Mixed Borings, Turnings	23.50-24.00
Cast Iron Borings	23.50-24.00
Short Shovel Turnings.	24.00-25.00
Punchings & Plate Scrap	35.00-36.00
Elec. Furnace Bundles.	37.00-38.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-38.00
Heavy Breakable Cast.	33.00-34.00
Malleable	38.00-39.00
No. 1 Wheels	35.00-36.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$36.50-37.00
No. 2 Heavy Melt. Steel	36.50-37.00
No. 1 Busheling	36.50-37.00
No. 1 Bundles	36.50-37.00
No. 2 Bundles	36.50-37.00
No. 3 Bundles	33.50-34.00
Machine Shop Turnings	28.00-28.50
Mixed Borings, Turnings	26.00-26.50
Short Shovel Turnings.	28.00-28.50
Bar Crops and Plate	39.00-40.00
Punchings & Plate Scrap	39.00-40.00
Cut Structurals	37.50-38.00
Elec. Furnace Bundles.	36.50-37.50
Heavy Turnings	35.00-36.00
No. 1 Chemical Borings	32.00-33.00

Cast Iron Grades

No. 1 Cupola Cast	46.00-47.00
Charging Box Cast	45.00-46.00
Heavy Breakable Cast.	45.00-46.00
Unstripped Motor Blocks	42.00-43.00
Malleable	52.00-53.00
Clean Auto Cast	45.00-46.00
No. 1 Wheels	45.00-46.00

NEW YORK

(Dealers buying prics, fob shipping point)

No. 1 Heavy Melt. Steel	$32.00
No. 2 Heavy Melt. Steel	32.00
No. 1 Busheling	32.00
Nos. 1 & 2 Bundles	32.00
No. 3 Bundles	30.00
Machine Shop Turnings	21.50-22.00
Mixed Borings, Turnings	21.50-22.00
Short Shovel Turnings.	23.50-24.00
Punchings & Plate Scrap	33.00-34.00
Cut Structurals	33.00-34.00
Elec. Furnace Bundles.	33.00-33.50
No. 1 Chemical Borings	24.50-25.00

Cast Iron Grades

No. 1 Cupola Cast	41.50-42.00
Charging Box Cast	41.50-42.00
Heavy Breakable	41.50-42.00
Unstripped Motor Blocks	35.00-36.00
Malleable	46.00-48.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$30.00-31.00
No. 2 Heavy Melt. Steel	30.00-31.00
Nos. 1 & 2 Bundles	30.00-31.00
No. 1 Busheling	30.00-31.00
Machine Shop Turnings	23.00-24.00
Mixed Borings, Turnings	23.00-24.00
Short Shovel Turnings.	26.00-27.00
Bar Crops and Plate	32.00-33.00
Punchings & Plate Scrap	32.00-33.00
Chemical Borings	24.00-25.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-42.00
Charging Box Cast	38.00
Heavy Breakable Cast.	36.00-37.00
Stove Plate	31.00-32.00
Unstripped Motor Blocks	30.00
Clean Auto Cast	40.00

CHICAGO

No. 1 Heavy Melt. Steel	$33.50-34.00
No. 2 Heavy Melt. Steel	33.50-34.00
Nos. 1 & 2 Bundles	33.50-34.00
No. 3 Bundles	30.50-31.00
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings.	28.50-29.00
Cast Iron Borings	28.50-29.00
Bar Crops and Plate	35.50-36.00
Cast Steel	34.50-35.00
Punchings	35.50-36.00
Elec. Furnace Bundles.	33.50-34.00
Heavy Turnings	30.50-31.00
Cut Structurals	35.50-36.00

Cast Iron Grades

No. 1 Cupola Cast	37.00-41.00
Malleable	38.00-41.00
Clean Auto Cast	37.00-41.00
No. 1 Wheels	39.00-41.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	34.50-35.00
Rails, Rerolling	40.00-41.00
Rails, Random Lengths	35.50-36.50
Rails, 3 ft. and under.	40.00-41.00
Rails, 18 in. and under	42.00-43.00
Railroad Specialties	39.00-40.00
Angles, Splice Bars	39.00-40.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$32.50-33.50
No. 2 Heavy Melt. Steel	30.00-31.00
Machine Shop Turnings	24.00-26.00
Short Shovel Turnings.	27.00-28.00

Cast Iron Grades
(Fob shipping point)

No. 1 Cupola Cast	38.00-40.00
Charging Box Cast.	32.00-34.00
Heavy Breakable Cast.	30.00-31.00
Stove Plate	29.00-32.00
Brake Shoes	36.00-38.00
Clean Auto Cast	39.00-40.00
No. 1 Wheels	38.00-40.00
Burnt Cast	29.00-32.00

Railroad Scrap

R.R. Malleable	50.00-52.00
Rails, Rerolling	37.50-40.00
Rails, Random Lengths	35.00-37.00
Rails, 3 ft and under.	40.00-42.00
Uncut Tires	34.50-35.50
Angles, Splice Bars	36.00-38.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$31.00
No. 2 Heavy Melt. Steel	31.00
No. 1 Busheling	31.00
Nos. 1 & 2 Bundles	31.00
No. 3 Bundles	25.00
Long Turnings	22.00
Short Shovel Turnings.	24.00
Cast Iron Borings	23.00
Bar Crops and Plate	32.00-33.00
Punchings & Plate Scrap	36.00-37.00
Cut Structurals	36.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	38.00-39.00
Stove Plate	34.00-35.00
No. 1 Wheels	32.00-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.00
R.R. Malleable	37.50-38.00
Axles, Steel	33.00
Rails, Rerolling	36.00-37.00
Rails, Random Length.	30.00-31.00
Rails, 3 ft and under.	32.00-33.00
Angles and Splice Bars.	32.00-33.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$19.04
No. 2 Heavy Melt. Steel	*19.04
No. 1 Busheling	*19.04
Nos. 1 & 2 Bundles	*19.04
No. 3 Bundles	*17.04
Machine Shop Turnings	*12.54
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths	21.00
Uncut Tires	28.00

*Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$20.0
No. 2 Heavy Melt. Steel	20.0
No. 1 Busheling	20.0
Nos. 1 & 2 Bundles	20.0
No. 3 Bundles	18.0
Machine Shop Turnings	11.5
Mixed Borings, Turnings	11.5
Punchings & Plate Scrap	21.5
Cut Structurals	21.5

Cast Iron Grades

No. 1 Cupola Cast	27.5
Charging Box Cast	22.5
Heavy Breakable Cast.	21.5
Stove Plate	23.0
Unstripped Motor Blocks	21.5
Malleable	27.5
Brake Shoes	27.5
Clean Auto Cast	27.5
No. 1 Wheels	24.0

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.0
Railroad Malleable	27.5
Rails, Random Lengths	20.5
Angles and Splice Bars	21.5

LOS ANGELES

No. 1 Heavy Mel'. Steel	$19.
No. 2 Heavy Melt. Steel	19.
Nos. 1 & 2 Bundles	19.
Machine Shop Turnings	14.
Mixed Borings, Turnings	14.
Punchings & Plate Scrap	27.
Elec. Furnace Bundles.	27.

Cast Iron Grades

No. 1 Cupola Cast	30.

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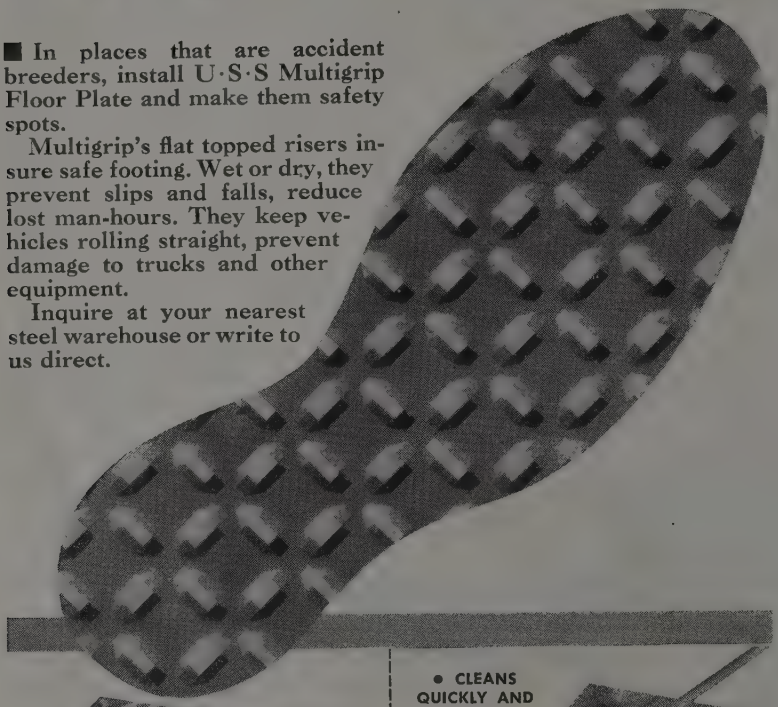

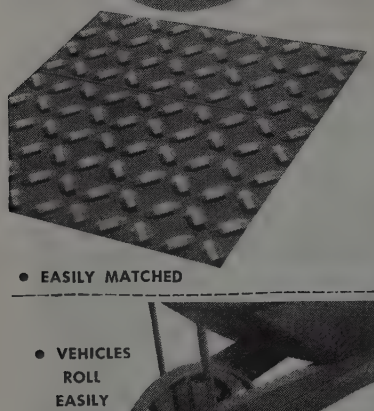

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Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
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7-312

UNITED STATES STEEL

Sheets, Strip...

Producers plan to maintain output of flat rolled products at high rate

Sheet Prices, Page 152

Pittsburgh—Output of sheets, strip and tin plate probably would be the last steel items to be adversely affected in event of a prolonged coal strike. Producers have been able to accumulate a fair stock of slabs which will help offset, for a brief period, the anticipated sharp curtailment in steel ingot production. An example of this was illustrated last week at U. S. Steel Corp.'s plants wherein sharp curtailment in primary steel output was almost immediately followed by a sharp reduction in output of plates, shapes, pipe, and bars (wire production facilities were previously shutdown for vacation period), while sheet and tin plate output was well sustained at company's Irvin Works. Seller state pressure for shipments has increased markedly in anticipation of mill shutdowns. Most metalworking companies are operating on a hand-to-mouth basis in respect to inventories, so any interruption in mill output will be immediately reflected in their operating schedules.

Mills' third quarter production schedules indicate little revision from last period, although it is too early to gage extent schedules may have to be revised to offset production loss resulting from a possibly long coal strike. Producers had counted on uninterrupted production throughout third quarter materially easing present tight supply situation in sheets and strip.

Boston — Narrow cold strip activity is slack, both in production and consumption, and uncertainty marks schedules for resumption of capacity output. Substantial volume is held up temporarily by vacations, and deferments on some tonnage are for longer duration. Scattered space will be available for new orders if all the deferments hold, but rerollers are cautious in accepting commitments until the situation clarifies later this month. Meanwhile more hot strip, covering a better range of sizes and grades, is in inventories, although there is no improvement in round wire for flattening. Demand for sheets is strong, but inability of mills to take on any additional volume limits number of firm orders. Flat-rolled stock is still the most needed product in many inventories and in some instances is the guide post in buying of other steels.

New York—While car construction continues to lag, sheet sellers here claim that local buyers for the car shops are pressing hard for tonnage. Most of these buyers claim that, while the industry as a whole has not gotten its production up to the scheduled rate, their own particular car shops are operating at full tilt, or as full as supplies of material will permit. These buyers claim that they could use more sheet tonnage than is now being allocated if it were only available.

Various sheet consuming plants in this district have been down over the past week for mass vacations and some are planning to continue down for another week. While some had requested that shipments be continued, the situation nevertheless has resulted in some what less pressure and has been particularly welcome as producers' schedules have been curtailed due in part to va

ion-taking and in part to the dis-bed situation in soft coal.

Unbalanced inventories have also con-uted some to an easing pressure in ets; however, demand is still very ng.

Philadelphia—As has been true in ne other lines, tie-in sales are com-ncing to appear in connection with inless sheets, which have been lagging dly for some time past. In other rds, some producers are offering cer-n amounts of the more urgently need-grades of sheets where consumers find y can also use some stainless. Some ducers have been forced to curtail inless output rather sharply as a re-t of declining demand.

Chicago—Users of sheets and strip, eady limiting their operations to avail-le tonnage of these products, now are ring further setbacks unless a coal ne contract is negotiated promptly. If miners do not return to the pits en the vacation period ends, output steel will drop sharply. The sheet d strip situation is tighter here than some other areas, due principally to thdrawals of eastern mills some time o and, in view of this, cancellations orders or holdup of shipments for cations are virtually nonexistent. One trict steelmaker is accepting no fur-er conversion commitments for the lance of the year, its excess finishing pacity being fully booked.

Cincinnati—Sheet mills in the district ceived a few requests for delivery ifts, because of fabricators' vacations, t these were in no sense a cut in de-nd which is maintained at previous gh levels and far beyond supply. Mills ntinue production at former levels in e of the coal miners' holidays. Mills ve not announced how soon curtail-nt will be forced in case of prolonged ne shutdowns.

teel Bars. . .

Bar Prices, Page 152

New York — Mass vacations at various nsuming plants have reduced the pres-e for bars, although producers have been able to benefit fully for the son that their own operations have en restricted by vacations and re-ction in raw steel due to the coal sis.

Should the coal situation clarify short-with producers again able to main-n a high production, the general eas-in bar supply which had been noted e this spring and early summer, will ely continue with a result that by the l of the current quarter, supply and mand will be in fair supply on all but very small sizes. The situation in d-drawn carbon bars would be even ier, it is believed. Hot and cold alloy supply is and has been for some time close balance with demand. In fact, liveries can be had within a few weeks either the hot or cold grades.

Boston—With inventories in better bal-e and with third quarter requirements ured on an increasing range of smaller es, pressure for carbon bars, notably d-drawn, has eased materially. As in-ated some weeks ago, bars are emerg-to a normal inventory and delivery el ahead of the other major hot-rolled bon products. All users of cold-finish-and alloys will not take full tonnage ered for third quarter, while supply of t-rolled to cold-drawing units is be-ming balanced in more sizes. There are

still tight spots, in the so-called wire sizes of cold drawn and smaller sizes of hot-rolled carbon, including flats and some cold heading stock, but for the most part, barring substantial production losses, the worst of consumer worries as regards bar stock appears to be ending.

Pittsburgh — Sellers report increased pressure for deliveries, reflecting attempt of consumers to augment inventories as much as possible as a hedge against a prolonged coal strike. Drastic curtailment of coke output at U. S. Steel Corp.'s Clairton Works to 38 per cent of capacity last week forced Carnegie-Illinois Steel Corp. to shut down one bar mill at its Duquesne Works, in addition to a number of other finishing facilities. Operating schedules at Jones & Laughlin Steel Corp. and Midland Steel Co.'s plants were well sustained last week, although sharp curtailments are indicated should miners remain on strike following their vacation period. Demand-supply situation in hot-rolled alloy bars continues in good balance with some mills promising deliveries on large sizes within 3 weeks. Cold-finished bar order backlogs are extended 3 to 4 months for most sizes, although flats and rounds, within very small size ranges, are not available until late this year. Anticipated interruption of carbon and alloy bar output on a much broader scale is expected to be promptly reflected in reduced production schedules among cold finishers, further extending delivery promises.

Philadelphia—Unless the soft coal dispute leads to serious disruptions in steel production, the end of this summer should witness a fair balancing of supp and demand in all sizes of hot carb bars except the very smallest. At prese customers have relatively little difficu in obtaining the larger sized rounds, 2 to 3 in. and over, and an easier tre in the medium ranges continues. Co drawn carbon bars are in easy supply virtually all sizes, and hot and cold all bars can be had from stock in so cases.

Buffalo — Output of bars was slash here during the week. Republic sh down its three mills for entire week give workers a vacation. Efforts will made also to build up ingot stocks. Bet lehem's Lackawanna mill suspended b operations for 24 hours over the holida

Seattle — Rolling mills operating capacity are booking new business about the rate of production, consequen ly order backlogs are about static. Me chant bar orders are of sizable volum but mills are unable to accept all bus ness offered and are naturally taking ca of the regular trade.

Tin Plate. . .

Tin Plate Prices, Page 153

Chicago — Operating with low inve tories and frequently getting into eme gency situations, tin plate consumers a constantly pressing mills for faster deli eries and increased allotments. Face with continued heavy overall deman plate makers are unable to provide muc in the way of relief. Specifications again third quarter allotments are reachin mills in good volume, covering expo as well as domestic. One tin plate ma ufacturer reports that September is th first month in which it can schedule fu ther third quarter business.

Steel Plate. . .

Plate Prices, Page 153

Boston—Due to premiums, couple with selective bookings, some mills a delivering plates at prices which ap proximate warehouse resale quotation Pressure for tonnage has slackene slightly, but mill schedules are filled f the third quarter with substantial carry over. Fabricators using heavy plate including weldment shops, have inve tories that are better balanced and som are buying less. This does not apply t lighter sizes. Relatively little tonnag has been accepted for fourth quarter de livery and the coal situation contribute to caution in making commitments.

New York — Eastern plate produc tion was off sharply the past week mills at Conshohocken, Pa., Sparrow Point, Md., and Claymont, Del., hav ing suspended operations for at leas the entire period. These suspension were due primarily to vacation-takin and in at least two cases had bee planned well in advance; however, muc will depend upon the coal situation as t whether they will resume this week. Pro ducers who were not down for the en tire week, suspended for the Fourth o July holiday and the following weekend

While many plate consuming plant also were down for vacations all of las week, with some planning to remai down still another week, the suspensio at the mills represented a curtailment i badly needed production. Most mills ar well behind on current commitments an have substantial backlogs. Those sellin on a quarterly basis have not opene their books for fourth quarter, but coul

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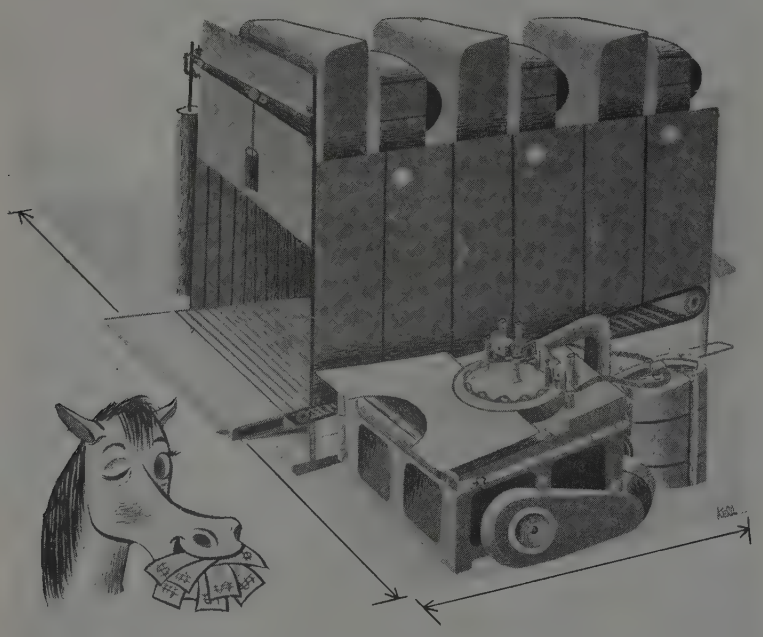

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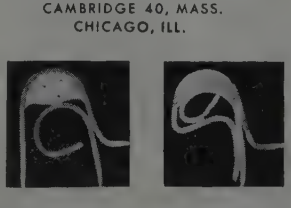

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DAREX "FLOWED-IN" COMPOUNDS MEAN BETTER STEEL PRODUCTS OF ALL KINDS

adily fill up their schedules for the mainder of the year if they were dis-osed to do so. Others, not selling on a uarterly basis, are practically booked up Jan. 1, 1948, even though they have een selecting tonnage carefully.

Disruption of operations at the eastern ip yards has provided some relief, but ot as much as might be supposed, for e reason that ship work has declined arply since the end of the war, with ost yards engaged only in miscellaneous pairs and conversion work.

Philadelphia — Plate production re-eived a setback last week, due largely time taken out for vacations. The laymont, Del., and Conshohocken, Pa., nishing mills were down for the en-re period and also the plate mill at parrows Point, Md. At Claymont the eelmaking department also was down, nd at Conshohocken, the blooming mill ifts were reduced from three to two, schedule which will be maintained for ne next two weeks to provide vacations r most of the workers. Should coal iners continue out for any length of me, plate production generally would ffer more severely. General strikes at ast Coast shipyards last week lifted me pressure on plate demand, although cally the Sun Shipbuilding yard at hester, Pa., has not been affected as bor contracts do not expire until late is year, and a relatively small yard in amden, N. J., has settled with its orkers.

Chicago — Platemakers continue to el that they have fulfilled their obliga-on to freight car builders, having ipped steel to them faster than it was eing fabricated. Official production of rs in June has not been announced, ut it has been estimated at around 00, which, if true, would be double lay output. It would appear as a re-lt of the recent headlining of the pe-oleum shortage that pressure may be ut on mills for plates for constructing nk cars. Considerable tonnage of plate as been going into pipe lines and there a growing feeling that the nation is st suspecting that too much pipe and ther steel products have been shipped ut of the country.

Seattle — Plate fabricators report a od volume of business in small lots but erations continue handicapped by arcity of materials. In jobs requiring eets, many substitutions are necessary.

Wire . . .

Wire Prices, Page 153

Pittsburgh — Extremely tight supply tuation in most manufacturers' and mer-ant wire items will be accentuated by terruption of mill production schedules sulting from vacation period shutdowns d curtailments in operating schedules ue to wildcat mine strikes. Finishing erations at American Steel & Wire o.'s Donora and Rankin plants here ere shut down for a one-week vacation eriod last week, and it appeared doubt-l that operations would be resumed ly 7, due to acute soft coal shortage. ellers have experienced a flurry in ressure for increased mill shipments as hedge against possibility of a pro-nged coal strike. However, such con-mer efforts generally proved fruitless nder producers' allocation distribution olicy to which they adhered closely. o relief in tight supply position of ost wire items is indicated through emainder of this year. Jobbers' stocks merchant wire products are badly out of balance with nails and fencing in most demand. All types of drawn and spring wire continue in short supply, notably cold-heading wire. Sellers also report a slight reversal of the downward trend in wire rope requirements.

New York—There are second quarter carryovers on some products with production tending downward due to vacations, although most consumers have held up shipments for the same reason. Future outlook for upholstery spring wire is uncertain. At the recent furniture show, most buyers placed orders for samples only, reversing the trend of one year ago. Wire users selling fabricated articles to the department store trade also are affected by the decline in buying from that direction. Wire wool producers are among those curtailing wire deliveries this month, but for the most part buyers indicate they will take third quarter allotments. Heading wire is among the tightest of the wire grades.

Boston—On a limited number of wire products shipments of late have been somewhat in excess of incoming orders, but the inroad on order backlogs has been halted by production losses due to vacation closings. In more instances than had been expected consumers, who also are closing plants for vacations, are not taking shipments. Continued improvement in music wire deliveries is apparent and some eastern mills can supply this grade from stock or can process promptly a moderate volume of orders. Most nonintegrated mills are short and out of balance on rod inventories.

Chicago — Wiremakers report continued and strong pressure for deliveries

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of all merchant wire products, particularly barbed wire, field fence in the heavier gages, bale ties and steel posts. Urgent requests for replacement fence has started to come from midwestern areas suffering floods recently. Demand for wire rope is normal. Volume of orders for manufacturers' items maintains steady volume, but there are increasing evidences that backlogs of consumers are shrinking rapidly, a condition which will make itself felt at mill level.

Tubular Goods. . .

Tubular Goods Prices, Page 153

Pittsburgh — Shipments of seamless and electric welded tubing have recorded little change in recent weeks at near capacity levels. However, acute shortage of tube rounds and strip is seen developing should a prolonged coal strike develop. Sellers report no easing in customers' pressure for deliveries, with output still falling far short of stated requirements. While many consumers continue to specify alloy tubing instead of carbon steel tubing because of comparatively easier mill delivery position, there appears to be an increasing tendency to revert to normal buying practice. Sharp curtailment of coke operations at U. S. Steel Corp.'s Clairton Works and July 4th week end shutdown, forced a substantial reduction in operating schedules at National Tube Co.'s plants last week. The latter company's Lorain Works was shut down last week for a week vacation. Jobbers expect no improvement in inventory status of standard pipe items through remainder of this year, while demand, which is far in excess of supply, shows no significant signs of easing.

Seattle — Demand for cast iron pipe has declined, due probably to uncertain and deferred deliveries. However, the potential market in this area is of major promise.

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Structural Shapes. . .

Structural Shape Prices, Page 153

Boston—Low bid on 1625 tons fabricated structural steel for the through truss and stringer bridge and approaches, Greenfield-Montague, Mass., was 15.00c a pound by the third lowest bidder, the total for the steel coming to $487,500. Quoting 16.60c a pound, low bidder for the general contract is J. F. Fitzgerald Construction Co., Boston, the steel contract amounting to $539,500 on a total bid of $903,914.20. A third contractor quoted 16.00c a pound on fabricated structural steel. State Engineer Office estimates on the material included a figure of 13.25c a pound. All contractors bid 10.00c a pound on steel reinforcing for structures, 130 tons. Low quotation on steel piles was 6.00c. This bridge is the largest active in New England, there being about 1600 tons, estimated or bid. Except for certain smaller sizes, pressure for plain material is easing slightly; at least fabricators are not combing the more distant markets for material. Any improvement in supply, however, would be quickly wiped out by delays in rolling mill schedules due to a coal shortage affecting output of semifinished. Inventory with fabricating shops has got into better balance, but this is not apparent with most warehouses.

New York—While there is little important buying, an increasing amount of structural work is being figured and, in general, fabricators have backlogs ranging from three to six months. There is still much hesitancy on the part of builders in going ahead because of the continued uncertainty with respect to deliveries of building materials, and because of the unsettled cost situation. The general stabilization of costs combined with a steadier flow of materials would result in a sharp spurt in building constructions. This may not come this year but should develop by early next year most fabricators believe.

Pittsburgh — Output of structural shapes was substantially reduced last week, reflecting shutdown of the No. 1 structural mill at Carnegie-Illinois Steel Corp.'s Homestead Works while the No. 2 mill operated only one turn a day prior to complete shutdown of facilities for July 4 weekend. Disruption in mill output has further accentuated an already tight supply situation for most structural steel items. Steadily rising construction costs continue to force shelving of a number of building programs, although most interests believe many of those projects will eventually materialize.

The local housing expediter's office recently approved the following construction programs: Edgar Thomson Works, Carnegie-Illinois Steel Corp., $168,000; Trimble Co., $290,000; Pittsburgh Forgings Co., $110,000; Westinghouse Electric Corp., $184,000. Merritt-Chapman & Scott, New York, received general contract for 14th street bridge, Washington, involving 4000 ton

bearing piles, 3000 tons sheet piling and about 400 tons of concrete bars.

Chicago—Structural steel fabricators report there is growing pressure from contractors and builders for firm contracts on fabricated steel, but uncertainties of steel supply and prices delayed for the time being the adoption of firm pricing. Exact prices have been quoted now and then on small jobs for quick delivery. Where mandatory for certain jobs some months away, contracts have been signed at levels which might be above those prevailing at time of delivery. A small volume of inquiry and few awards of note forecast that structural fabrication is likely to drag along at low level for the next few months.

Seattle — Fabricating shops have sufficient backlog to insure steady operation for some time but lack of supplies is restricting bidding on larger projects. Considerable business in small tonnages is being offered, although a seasonal decline has appeared. Mill allocations are below requirements.

Reinforcing Bars. . .

Reinforcing Bar Prices, Page 152

Pittsburgh — Concrete bar output was hard hit last week as result of sharp curtailment in operations at Carnegie-Illinois Steel Corp.'s plants. This situation is expected to spread to other plants should a prolonged coal strike develop. Sellers state third-quarter production schedules, as originally established, were far below stated requirements, while present interruption to operations will necessitate complete review of schedules to reduce allotments in line with production losses. Producers' and fabricators' stocks of concrete bars already are badly depleted so present curtailment in output will almost directly adversely affect fabricating activity.

Due to extended mill deliveries, high construction costs and inability of customers to obtain firm cost estimates continue to hold up some industrial expansion programs, road work and similar public jobs. However, many of these jobs are held essential so it appears probable additional money outlay will be made available.

Seattle — There is a heavy volume of orders for reinforcing in small tonnages. However, some sizable orders are immediately pending, including 500 tons or more for the University of Washington $1½ milllion administration building, bids July 22. Bureau of Reclamation, Denver, has called bids July 17 for two schedules for Wyoming canal, calling for 225 tons reinforcing and other metals.

Semifinished Steel . . .

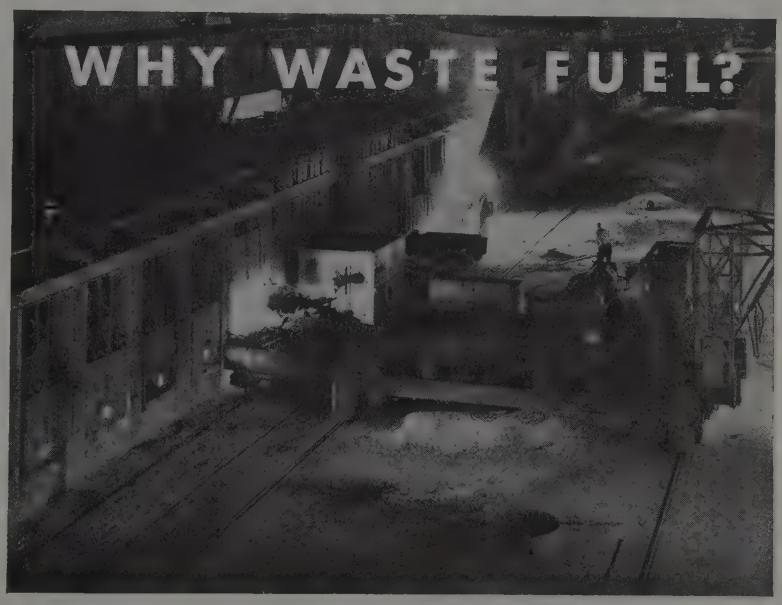
Semifinished Prices, Page 152

Pittsburgh — Uninterrupted semifinished steel output to date this year suffered a sharp setback last week, reflecting substantial curtailment in primary steel prdouction at U. S. Steel Corp.'s subsidiary plants due to acute shortage of soft coal. Extent of reduction in output is indicated by decline of nearly 50 per cent in company's merchant and concrete bar output, while similar drastic curtailments occurred in production of shapes, plates, pipe and wire items. Reduction in semifinished output is scheduled at other plants in this district should a coal strike develop. Prior to recent curtailment in operations, sellers were hopeful semifinished steel suuply would be in better balance with demand by close of third quarter. Sheet bars and wire rods have been in most critical short supply, with most nonintegrated interests forced to operate below capacity as a result.

Rails, Cars . . .

Track Material Prices, Page 153

Pittsburgh — Freight car construction continues to lag behind projected assembly schedules, with little prospect of the 10,000 car monthly goal being reached until late this year. Car builders contend it is impossible to step up assembly schedules until adequate steel and components are on hand to assure uninterrupted operation. In recent months car builders have been able to slightly augment inventories but this trend is expected to be reversed should a coal strike occur. Wildcat mine strikes prior to scheduled vacation period of miners have already forced Carnegie-Illinois Steel Corp. to sharply curtail output of urgently needed rails, plates, structural items and bars. An indication of the extent freight car construction is falling behind projected schedules is illustrated by the estimate that output during June approximated only 5500 units. It is also pointed out that car retirements during first five months this year exceeded number of new cars received from the builders by about 5000 cars; shrinkage in box cars alone amounted to 2300. Deficiencies in open top cars are said to be greater than for box cars.



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Pig Iron Premium Plan Revised With Its Extension to Yearend

TWO BASIC changes were made in the government's regulation covering pig iron premiums simultaneously with its extension for six months. Premium payments to pig iron producers who exceed their shipment quotas will be continued through Dec. 31, 1947, as noted briefly in the preceding issue of STEEL.

The first change permits the housing expediter to notify pig iron producers "from time to time" to ship their over-quota tonnage, or part of it, to designated manufacturers of "items needed in, or in connection with, the construction of housing."

Payments would be made only to the extent that the pig iron producers comply with the expediter's notifications regarding shipments to specific manufacturers of housing-type items. (Example: Producer A's quota is 1000 tons. His production is 1200 tons, making him eligible to receive premiums on the extra 200 tons. However, the expediter notifies him to ship 100 tons to a cast iron soil pipe foundry. If producer A ships in accordance with this notification he receives premiums on all 200 tons; otherwise, he receives premiums only on 100 tons.)

The premiums amount to $8 a ton on over-quota shipments made by operating plants and $12 a ton for plants opening after June 30.

A second change in the regulation reclassifies some producers, shifting them from the $12 group to the $8 group, and provides for some change in quotas.

The premium payment plan on foundry and malleable grades of pig iron was instituted last September and was originally scheduled to end on June 30. The premium payment plan covering cast iron soil pipe ended on that date.

Decision to extend the pig iron program was made following a meeting between Housing Expediter Frank R. Creedon and his staff and representatives of the leading iron and steel producers. The latter said that production of foundry and malleable grades of pig iron would drop at least 70 500 to 78,000 tons a month if the production incentive payments were terminated on June 30. This cutback would comprise "a sizable portion" of the total production of such grades, Mr. Creedon said, which is now about 450,000 tons a month, and would "seriously delay and impede" home building.

The first eight months' operations of the pig iron premium plan (September, 1946, through April, 1947) resulted in shipments of 785,000 tons in excess of quotas established for companies participating in the plan.

Pig Iron . . .

Pig Iron Prices, Page 154

Philadelphia — Due mainly to special conditions applying to coke supply, the Birdsboro, Pa., pig iron producer has advanced all grades $6 a ton. Thus, No. 2 foundry is now holding at $40.50, Birdsboro base; basic, $40; bessemer, $41.50; malleable, $41; and low phos, $45. As a result of this change the governing basing point for Philadelphia on foundry, bessemer and malleable is once again Swedeland, Pa. With a freight from Swedeland to Philadelphia of $1.04, No. 2 foundry, delivered Philadelphia, is $36.54, bessemer $37.54, malleable $37.04.

With low phos at Birdsboro now $45 base, Steelton, Pa., with a price of $39, becomes the governing basing point on that grade for Philadelphia. The freight rate from Steelton to Philadelphia is $2.22; consequently the delivered Philadelphia price for low phos is now $41.22.

As another feature in the price situation here, the Swedeland producer has temporarily reverted to the method applied for a short time this spring of selling basic on the value of replacement scrap. As a result of this, combined with a $6 advance in the base price at Birdsboro, Bethlehem, Pa., is now the governing basing point on basic delivered Philadelphia. The Bethlehem price is $34 and the freight rate from Bethlehem to Philadelphia is $1.72, which brings the delivered Philadelphia price up to $35.72.

Widespread suspension of operations last week at eastern foundries for mass vacations was largest in history. Due to stringency in iron practically all, however, arranged for the handling of scheduled shipments of iron during the period. Various consumers of finished steel likewise were closed down for vacations, although a number did not arrange for incoming shipments. Most in this respect acted on the assurance of their regular suppliers that they would not lose out on tonnage.

Nashville, Tenn.—Tennessee Products Corp. advanced charcoal pig iron prices $2.50 July 1 to $43 per gross ton, fob Lyles, Tenn. Following termination of controls under the Office of Price Administration, this product was advanced $4.50 a ton to $37.50, and on Mar. 6 to $40.50.

Recent advances reflect steadily rising production costs.

New York—District pig iron melt in July will unquestionably be down from last month. Many foundries closed down for mass vacations for the past week and some, it appears, will be down for the current week as well. Meanwhile some furnaces supplying iron have suspended operations primarily because of the soft coal situation. If miners do not return to work this week following the paid vacation period of ten days just ended, various other furnaces likewise will suspend, bringing pig iron shipments to a virtual standstill in fairly short order.

Not only will foundries be handicapped by lack of pig iron but by lack of coke as well, with one about as scarce as the other at present. Some consumers could carry on for a while, but stockpiles generally are well below normal and if consumers did not suspended completely because of lack of new shipments of pig iron and coke, they would probably curtail to some extent so as to conserve stocks on hand.

Pittsburgh—Merchant pig iron output was well sustained last week, with the lone producer reporting sufficient coal stocks for 30 days' capacity output. While most integrated steel producers held pig iron production schedules intact, U. S. Steel Corp.'s output was sharply curtailed with the equivalent of only 14.5 blast furnaces out of 30 in the district pouring iron. Extension of the premium payment plan for foundry iron to stimulate output for federal housing

requirements has eased the pressure somewhat for higher prices. Curtailment in output of foundry iron almost immediately would be reflected in production schedules at most foundries, although cessation of beehive coke output soon may have same effect. General shortage of cast scrap accentuates the entire operating problem.

Boston—Not affected by the extension of the premium payment plan, Mystic Iron Works, Everett, Mass., is operating under mutual agreements with $45, furnace, applying to No. 2 foundry shipments. Thus New England foundries operating with Everett iron are paying $15.50 more a ton than they have been since last fall. This furnace for some time is destined to be the source of the bulk of iron for most shops with shipments from Buffalo and other points at low levels. Currently melt is down due to closings, but consumers will take all available tonnage this month. All basic is coming in from outside points and some has arrived by barge at Providence.

Chicago—Pig iron supply continues so far below demand in this district that foundries shutting down for vacations are making arrangements to unload iron shipped to them. Thus, suppliers report no requests for shipments to be held up. Melters feel that this will spare them the risk of loss under their quotas and will provide higher level operations after vacations are over. Foundry coke is equally as short as pig iron and production will be cut sharply and quickly if a mine contract is not negotiated within a week. Inland Steel Co. last week decided not to bank its merchant blast furnace as planned because of the coal situation. However, beginning July 1 this stack will make basic iron half the time to bolster steel production.

Buffalo — Downstate foundries, which have been worried over recent shrinkages in order backlogs, have received fresh business. Buyers, however, have become more cautious as queries for iron show interest in prices as well as in delivery dates. Merchant iron sellers, nevertheless, find a ready market for the entire current output with July allocations about the same as in June. Increased demand, coupled with limited production, has tightened the market for silvery iron. Foundries are still handicapped by lack of uniform coke which presumably receives about an 18-hour treatment instead of 24 hours. While blast furnace operations remain unchanged at 81 per cent of capacity, the Bethlehem Lackawanna plant is rushing a relining job on a stack shut down less than a month ago and plans to have it back in action within a week.

Cincinnati—Vacations are the rule in district foundries, and although these are staggered the overall result is a cut in the melt for late June and for July. Despite the cut in the melt, foundrymen are seeking all the pig iron they can get.

Bolts, Nuts. . .

Bolt, Nut, Rivet Prices, Page 153

Boston—In revising bolt and nut prices some producers are withdrawing price-at-time-of-shipment provisions and guaranteeing prices for a three-month period, effective July 1. Prices of certain sizes, notably the smaller ones, have increased slightly, while others are lower, there being little overall change, although the increases cover better moving sizes for the most part. Distributors are revising their quotations in line with producers.

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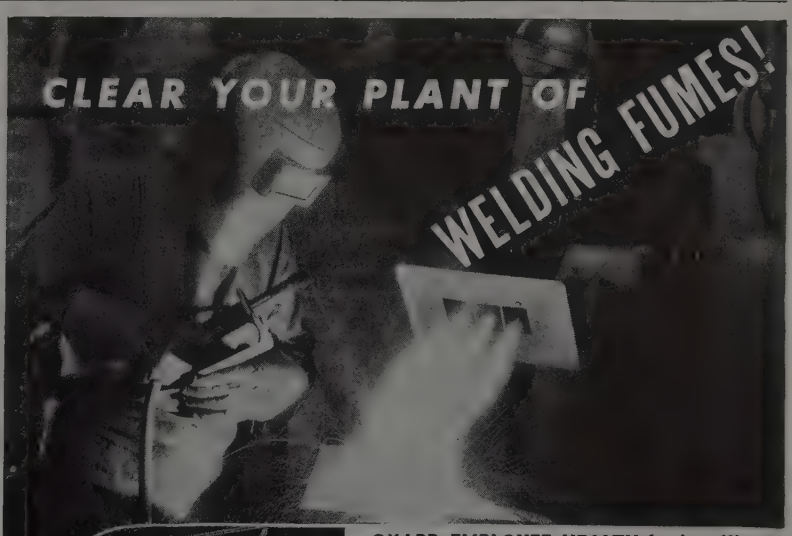

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Scrap. . .

Scrap Prices, Page 158

Pittsburgh—Relatively little buying is noted in this district as most consumers continue to await outcome of coal contract negotiations. The leading interest has reduced blast furnace and open hearth operations sharply and claims to be accumulating scrap as a result of receipt of shipments on old orders as well as those coming directly from customers. This producer recently released shipments on old $30 orders at present market levels, but undoubtedly most of this tonnage was already on hand.

Present price level of $34.50 to $35 for open-hearth grades is largely nominal, for it is claimed that on the basis of price levels at remote points dealer scrap could not be delivered here for less than $38. One broker contends he couldn't cover a large order today at the $35 level.

Cast scrap grades remain very scarce with price tone stronger, reflecting the effort of foundries to accumulate material as a hedge against anticipated pig iron shortage.

Boston — Activity in open-hearth scrap has sagged to a low point with signs of some softness in prices; at least the advance appears to have halted. Competition among brokers for tonnage contributed toward the recent increase in prices. Recent high quotations on Boston naval shipyard steel scrap are not representative of the price structure now. Cast grades also are dull.

Luria Bros. & Co. entered the highest bid on the July accumulations of heavy melting steel at the Boston naval shipyard at $32.76 per gross ton. For unprepared heavy melting steel, South Boston Iron & Metal Co. was high at $29.08 and B. Abrams & Sons Co. Inc., Harrisburg, Pa., was high on light iron at $23.68.

Chicago — The higher prices for scrap established here a week ago continue to hold unchanged. Open hearth material of factory origin commands $34 a ton delivered, but buying is not in heavy volume. Indications are that consumers are resisting the higher price level. Scrap shipped from dealers' yards holds at the differential of $1 below factory. Steelmaking operations last week were unaffected by the vacation in coal mines, but some curtailment seems likely if a new contract is not signed quickly. Opinion is divided as to whether scrap demand would decline if steelmaking declines or whether mills would seek to bolster inventories. Cast grades of scrap were unaffected by the recent rise in steel making grades.

WAA is taking sealed bids July 16 on 175 gross tons of steel scrap salvage at its warehouse 21, formerly known as the Gary Armor Plate Plant, Gary, Ind.

Buffalo — Although both sides are acting cautiously, strength continued to dominate the scrap trade. While sales of consequence were absent during the holiday week, dealers reported they were turning down mill bids at the old $32 a ton price for heavy melting and bundles. Some dealers with tonnage outstanding at $30-$32 a ton reported they were losing money trying to cover sales. Rumored prices on heavy melting steel on pending new deals range from $33 to $34 a ton, substantiated by purchases made by local consumers in nearby areas, which cost, with additional charges, from $35 to $40 a ton.

Cleveland—Mills remained out of the scrap market here last week and anticipated a weakening in prices should the miners fail to return to work July 8. Mills continue to receive shipments on old contracts and will attempt to build up reserves as long as production is curtailed. A brokers' market prevails, many of them paying premiums above mill prices in order to cover commitments. Brokers have paid around $37, Youngstown, for heavy melting steel, $30 for machine shop turnings, and $32 for short shovel turnings and cast iron borings.

Cincinnati—Prices for iron and steel scrap moved higher, heavy melting steel being quoted currently at $32. There is a note of caution among some buyers, but this would quickly disappear, it was predicted, in case of a quick settlement of discussions in the coal fields. Some major melters are fairly well stocked with scrap, heavy inventories being considered feasible in consideration of the high steelmaking rate and scarcity of pig iron. Vacations are bringing a number of shipment holdups.

Detroit—In the face of strong demand for scrap from mills outside this area, local buyers have boosted prices again by $2 per ton on open-hearth grades, dealers' buying prices now ranging $29.50-$30.00. This is still around $6 off the previous peak price, and brokers see further upward movement in the weeks ahead, reasoning that the former high price level drained off most scrap which could be enticed for the money. Machine shop turnings are stronger by $1 per ton, while short shoveling turnings and borings are up $1.50 to $25.00-$25.50. Cast iron grades hold unchanged.

Warehouse. . .

Warehouse Prices, Page 155

Cleveland—With mills curtailed or shut down completely by the holiday weekend, dwindling coal stocks and vacation periods, warehouses here immediately felt the loss of steel. One jobber, reporting that prior to last week's events his mill shipments had begun to improve and the hoped-for balance of supply and demand could be seen distantly, said the current situation will possibly set him back about six months. Another interest said the supply picture has been largely unchanged in the tight flat-rolled products over the past several months and could only become worse in the near future. Still contributing to lower mill shipments is the Pittsburgh teamsters' strike, tieing up steel destined for some Cleveland distributors. In addition, the freight car shortage limits the amount of steel brought in by rail.

Boston — Unbalance in inventories continues to affect warehouse sales and overall demand is somewhat slower. However, the decline is heavier on products with which distributors are better supplied, in the case of alloys. Resellers are pressing for tonnage of flat-rolled, plates, structurals, and other more active materials, but are holding up in some cases on others, including cold-finished bars. Prospects for an improvement in supply of most critical products this quarter has faded.

New York—Structural quotas for third quarter to some distributors have been reduced 50 per cent down to 1 x 1 sizes and including bar shapes. Only

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bars in the most active carbon products show signs of easing, with flat-rolled, plates, pipe, nails and other wire products notably short. There is also a revival in the "gray" market for galvanized sheets, with spot lots offered at around 12 cents a pound. Demand for warehouse steel has slackened mostly on products with which distributors are best supplied, including metal lathing.

Philadelphia—Warehouse business in June was about on a parity with May, although the prospect for this month is not so promising due principally to seasonal influences. Further, should steel production be tied up by a soft coal strike, there would be greater pressure on jobbers for tonnage, but decline in incoming shipments from mills may in the end actually contribute to a lower volume of sales. Opinion on this point is somewhat divided, however. Some distributors declare their inventories are in better balance than they have been at any time this year, although leaving much still to be desired, especially in sheets and strip, light shapes and small hot bars.

Pittsburgh—Distributors' restricted inventories are expected to be further reduced as result of sharp curtailment last week in mill output of nearly all steel items except sheets, strip and tin plate. A noticeable increase in pressure for shipments from warehouse stocks has developed, although continued strict allocation of available tonnage has prevented any significant change in normal distribution pattern. Temporarily, warehouse steel customers with railroad sidings outside this immediate area have been allotted more steel because of local AFL-Teamsters truck strike. This situation has forced a number of metalworking plants here to curtail production schedules.

Cincinnati — Intrusion of a holiday brought a temporary decrease in ordering from warehouses but this is not likely to trim the sales volume for the month as buyers are taking, especially in scarce items, all tonnage available.

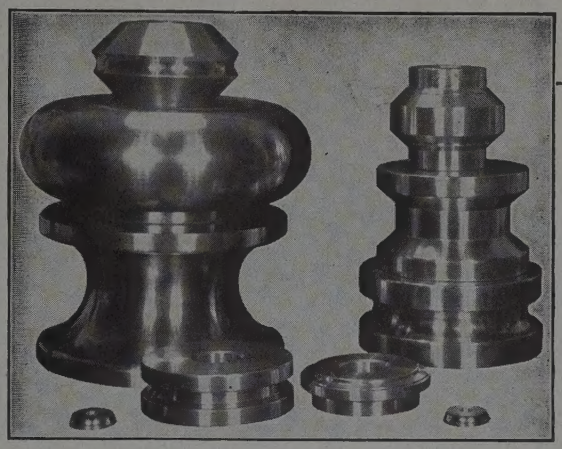
Seattle — The jobbing trade reports a steady volume on a par with a year ago, all items being in strong demand. Inventories continue extremely low. The price list is unchanged and none is planned unless mills take the initiative. Sheets, nails and reinforcing are critical, while other items have improved.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 154

Philadelphia — Foundry coke here has been advanced to $15.50, ovens, an increase of $1 for consumers in the immediate territory. This follows advances in beehive coke prices.

Pittsburgh — Complete shutdown of beehive coke oven operations is expected to soon adversely affect foundry production schedules. Most foundries have 2 to 3 weeks' fuel supplies but will probably curtail output much sooner as a hedge against possibility of a prolonged coal strike. Foundry coke recently has been in somewhat better supply than pig iron, but this situation will soon be reversed because the merchant iron producer here expects to maintain normal output for at least 3 to 4 weeks even though a long coal strike develops. Independent coke plants have about a 30 days' supply of coal. However, leading steel producer here was forced to sharply curtail output of coke at its Clairton Works last week to 38 per cent of capacity; output at other integrated plants was fairly well sustained.



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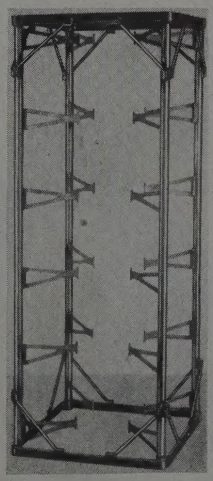

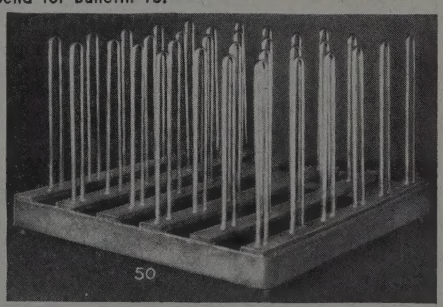

Stanwood Corporation
FABRICATED METAL PRODUCTS
4825 W. Cortland St. Chicago 39, Ill.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5700 tons sheet piling and 1500 tons concrete bars, Chain of Rocks canal, Granite City, Ill., to River Construction Co., New York.

4000 tons bearing piles, 3000 tons sheet piling and 400 tons concrete bars, for 14th St. bridge, Washington, Merritt-Chapman & Scott, New York, general contractor.

1360 tons, five bridges near Puyallup, Wash., for U. S. engineer, to Bethlehem Pacific Coast Steel Co., Seattle; general contract to Manson Construction Co., Seattle, at $1,049,373.

700 tons, power plant, Consumers Power Co., Comstock, Mich., to American Bridge Co., Pittsburgh.

260 tons, bridge repairs, Illinois and New Mexico, for Atchison, Topeka & Santa Fe railroad, to American Bridge Co., Pittsburgh.

200 tons, factory, Illinois Tool Works Co., Elgin, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.; Charles E. Giertz & Son, Elgin, Ill., contractor.

Unstated, special steel for 400-cell addition to state prison, Salem, Oreg., to Van Dorn Iron Works, Cleveland; low $249,750.

STRUCTURAL STEEL PENDING

6000 tons, veterans hospital, South Orange, N. J., after some delay, expected to be up for bidding around Sept. 1.

6000 tons, veterans hospital, Syracuse, N. Y., expected up for figuring late this summer.

2500 tons, section of Market St. subway, Philadelphia, George H. Flynn Corp., 551 Fifth Ave., New York, low on general contract.

1700 tons, power plant extension, Indianapolis Power & Light Co., Indianapolis; bids July 2.

1625 tons, through truss and stringer bridge and approaches, Connecticut river, Greenfield-Montague, Mass.; J. F. Fitzgerald Construction Co., Boston, low, $903,914.20.

1000 tons or more, transmission towers, spec. 4009, for Bonneville Power Administration; bids in, ranging from $1,771,551 to $2,647,340 on various schedules and alternatives.

850 tons, main catalyst structure, Carter Oil Co., Billings, Mont.

730 tons, addition, Gunther Brewing Co., Baltimore, pending.

665 tons, store building, Sears, Roebuck & Co., Chicago.

600 tons, highway bridge, Alaska, for Alaska Road Commission.

500 tons, highway span, Columbus, Tex., for State Highway Commission.

325 tons, Royal river bridge and grade separations, Yarmouth, Me.; Ellis C. Snodgrass Inc., Portland, Me., general contractor, $335,550.

300 tons, plant addition, Bakelite Corp., Bound Brook, N. J., bids asked.

300 tons, Jewish Center, Rego Park, Long Island, bids asked.

300 tons, high school, Towson, Md., bids July 17; considerable reinforcing steel will also be required.

125 tons, school, Sollers Point, Md., pending.

110 tons, school, Glen Burnie, Md., pending.

Unstated, telephone exchange addition, Eugene, Oreg.

REINFORCING BARS . . .

REINFORCING BARS PLACED

600 tons, warehouse and garage, Western Electric Co. Inc., St. Louis, to Laclede Steel Co., St. Louis; Austin Co., St. Louis, contractor.

250 tons, rotogravure plant, R. R. Donnelley-Crawfordsville Co., Inc., Chicago, to Olney J. Dean Steel Co., Chicago; Peter Hamlin Construction Co. Inc., Chicago, contractor; bids June 20.

250 tons, Xavier hospital, Dubuque, Iowa, to Concrete Steel Co., Chicago; Unicliff Construction Co., Davenport, Iowa, contractor.

240 tons, parts warehouse, Packard Motor Car Co. of Chicago, Chicago, to Olney J. Dean Steel Co., Chicago; Clarence A. Franzen, Chicago, contractor; bids March 28.

225 tons, warehouse for Associated Groceries, Seattle, to Bethlehem Pacific Coast Steel Co., Seattle.

197 tons, Calumet grade separation, Sec. 066-0505.3, for Cook county, Ill., to Carnegie-Illinois Steel Corp., Chicago; also 52 tons H-piling to Carnegie-Illinois; Thomas McQueen Co., Forest Park, Ill., contractor; bids March 19.

170 tons, Power building, Chicago, for Walter P. Powers, to Joseph T. Ryerson & Son Inc., Chicago; McCarty Bros., Chicago, contractor.

100 tons, factory building, Rath Packing Co., Waterloo, Iowa, to Ceco Steel Products Corp., Omaha; Miller Construction Co., Waterloo, Iowa, contractor.

REINFORCING BARS PENDING

2200 tons, Kostner Ave., auxiliary outlet sewers, Department of Public Works, Chicago; Tully Construction Co., Chicago, low on general contract; bids June 30.

925 tons sewer, S. Omaha, Nebr.; Peter Kiewit Sons Co., Omaha, low on general contract; bids June 5.

225 tons, units of Wyoming canal, near Riverton, Wyo.; bids to Bureau of Reclamation, Denver, July 17.

200 tons, Lake water pump house, Cities Service Oil Co., East Chicago, Ind.; Great Lakes Dredge & Dock Co., Chicago, contractor; bids June 30.

150 tons, bridge, Decatur, Nebr.; Industrial Construction Co., Minneapolis, contractor; bids June 16.

Unstated, University of Washington's $1½ million administration building, Seattle, bids to board of regents, July 22.

Unstated, vocational and technical school, estimate $900,000; bids to Tacoma, Wash., school board about July 15.

Unstated, $420,000 plant for Rudie Wilhelm Warehouse Co., Portland, Oreg.; bids soon.

Unstated, concrete-lined, 5000-foot tunnel, for California-Oregon Power Co. project Toketee Falls, Oreg.; plans ready in July.

Unstated, $900,000 processing plant for Tillamook County Creamery Association, Tillamook, Oreg.; bids in negotiation.

Unstated, chemistry building, University of Illinois, Urbana, Ill.; bids July 15.

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Coil Stock
LITTELL Automatic Centering REELS are easy feeding, due to—
(1) Automatic centering, which keeps coils evenly balanced.
(2) Loose loops of stock, caged by two arms.
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Littell Reels are made in many capacities, with and without motors. Littell also makes a complete line of Feeds, Straighteners, Air Blast Valves, Vacuum Pickers, etc.
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During the National Machine Tool Builders Show, Chicago, Sept. 17-26, we are keeping open house at our Shop. See display of our Automatic Feeds and Reels for Coiled Stock at our Plant.
SPEED WITH SAFETY
F.J. LITTELL MACHINE CO.
4165 RAVENSWOOD AVE., CHICAGO 13, ILL.

PLATES . . .

PLATES PLACED

150 tons, tanks for Tidewater Associated Oil Co. terminal, Tacoma, Wash., to Puget Sound Sheet Metal Works, Seattle.

150 tons, facilities for medical building, University of Washington, Seattle, to Puget Sound Sheet Metal Works, Seattle.

Unstated, 42 and 45-inch river crossing for Eugene, Oreg., to Steel Tank & Pipe Co., Portland, Oreg.

PLATES PENDING

3200 tons, 27,120 feet, 66-inch supply pipe line, replacing 42-inch pipe, Cedar river project; bids to Seattle, July 10.

Unstated, 1500-foot steel penstock, power project, Toketee Falls, Oreg., for California-Oregon Power Co.; plans ready in July.

PIPE . . .

CAST IRON PIPE PLACED

1300 tons, various specifications, for Tacoma, Wash., to H. G. Purcell, Seattle; for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

3000 tons, various sizes, stock purposes, Seattle; bids in June 30.

RAILS, CARS . . .

RAILROAD CARS PLACED

Norfolk & Western, 2000 hopper cars, to own shops at Roanoke, Va.

RAILROAD CARS PENDING

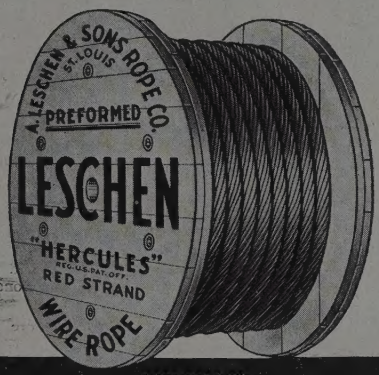
Norfolk & Southern, 250 fifty-ton box cars; bids asked.

TOUGH STRONG SAFE DURABLE

"HERCULES"

REG. U.S. PAT. OFF.

RED-STRAND WIRE ROPE



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WIRE ROPE MAKERS ESTABLISHED 1857

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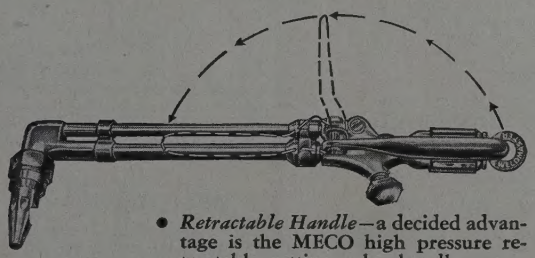
Does the **CUTTING Attachment** *you use have these Advantages?*



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- *For Use Up to 6-inch Cutting*—only one attachment is necessary for efficient cutting.
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Meco

For years, the MECO CUTTING ATTACHMENT has lead the field for practicability—now in '46, you'll find it far out in front! A demonstration will prove that statement.

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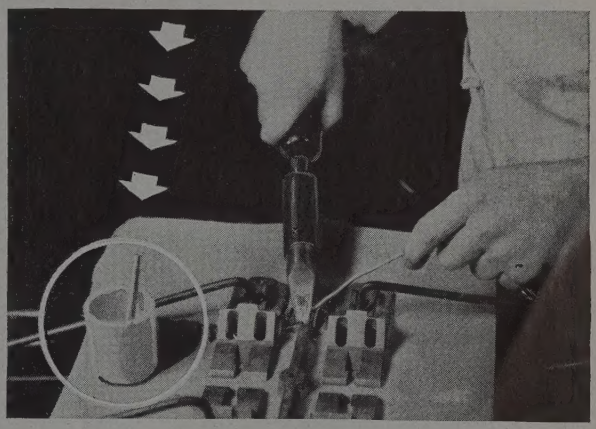
MODERN ENGINEERING COMPANY, Inc.

3403 PINE BLVD. ST. LOUIS 3, MISSOURI

An effective FLUX for every soldering job



Use KESTER Fluxes

• The use of wrong flux in any soldering operation means solder failure. Select your flux from Kester's complete high quality line and be sure you're using the chemically and physically correct flux for your particular soldering job.

• Nearly half a century of practical experience has resulted in the development by Kester of efficient and effective fluxes for every soldering operation. Proven in industry, Kester Fluxes are your assurance of clean, tight solder bonds—solder bonds that hold tight against vibration, shock, twisting, bending, and expansion and contraction caused by temperature extremes.

• Each one of the hundreds of Kester fluxes has been carefully tested in the laboratory and in practical application. Today, not only is the performance of each Kester flux definitely known, but also the circumstances under which each one should best be used.

• So look to Kester Fluxes for the answer to any flux problem. Without obligation to you, Kester engineers will gladly specify the flux that fits your special needs.

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KESTER

Solder Fluxes

STANDARD FOR INDUSTRY

CONSTRUCTION AND ENTERPRISE

CONNECTICUT

BRIDGEPORT, CONN. — Bridgeport Metal Goods Mfg. Co., Cherry St., will build a $109,000 factory.

HARTFORD, CONN. — Home Maintenance Co., 21 Griswold St., plans to build a $55,000 warehouse and office at Maple Ave. and Douglas St.

FLORIDA

JACKSONVILLE, FLA.—Sampson Machinery & Supply Co., Houston, Tex., was low bidder for a cross-state pipeline stretching from Carrabelle to Jacksonville, at $676,104.

ILLINOIS

LINCOLNWOOD, ILL.—Federal Tool Corp., 412 N. Leavit St., Chicago, has awarded a $63,000 contract to Campbell-Lowrie, Lautermilch, 400 W. Madison St., Chicago, for construction of a 1-story factory here.

LAGRANGE, ILL.—Electro Motive Corp. has awarded the general contract for construction of a 1-story warehouse addition to Ragnar Benson Inc., Chicago.

SKOKIE, ILL.—Leader Electric Mfg. Corp., 6127 Broadway, Chicago, has awarded a $225,000 contract to Ragnar Benson Inc., 4744 W. Rice St., Chicago, for construction of a 1-story factory and office.

SPRINGFIELD, ILL.—Pillsbury Mills Inc., 1000 N. 16th St., has awarded a $1,500,000 contract to Kaiser-Ducett Co., Railway Exchange Bldg., Chicago, for a pre-mix mill plant.

INDIANA

INDIANAPOLIS—American Can Co., 230 Park Ave., New York, has awarded a $600,000 contract to C. M. Geupel Construction Co., 1109 Hume-Mansur Bldg., for construction of a 1-story factory.

ROCHESTER, IND.—Sealed Power Corp., Muskegon, Mich., will build a $200,000 factory here. Engineer is E. P. Young.

IOWA

RED OAK, IOWA—National Carbon Co., Ever-Ready Division, 30 E. 42nd St., New York, has awarded a $1,500,000 contract to Gilmore, Carmichael & Olson Co., 1873 E. 55th St., Cleveland, for construction of a battery plant here.

MASSACHUSETTS

PITTSFIELD, MASS.—General Electric Co., Morningside St., will build a $62,000 plant to be used for preparing plastic compounds.

MICHIGAN

DETROIT—Tri-West Products Inc., 510 W. Jefferson, has been formed by Frank Manduch with a capital of $50,000 to manufacture tools, dies and machines.

DETROIT—Roura Iron Works Inc., 1401 Woodland Ave., has been formed by Joseph J. Roura Jr. with a capital of $150,000 to engage in a general manufacturing business.

DETROIT—National Electric Washer Co. Inc., 8400 Livernois Ave., has been formed by Samuel Raime with a capital of $150,000 to manufacture domestic type laundry equipment.

DETROIT—Apex Foundry Inc. has awarded a contract to Austin Co. for construction of a $125,000 foundry building.

DETROIT—Acme Roll Co., 2717 E. Larned, has been formed by Albert E. Barlow with a capital of $50,000 to manufacture and sell moldings.

FLINT, MICH.—Buick Motor Division of General Motors Corp. is planning a $442,698 factory alteration project.

GRAND RAPIDS, MICH. — Nash-Kelvinator Corp. has received OHE approval of an $80,000 addition to its plant.

GRAND RAPIDS, MICH.—R. C. Allen Business Machines Inc. has received OHE approval of a $70,000 addition to its plant.

HAMTRAMCK, MICH.—Cass City Mfg. Corp., 301 Campau, has been formed by Mike Maleski with a capital of $50,000 to manufacture and sell tools, dies and machinery.

JACKSON, MICH.—Goodyear Tire & Rubber Co., Akron, is taking figures for construction of a $148,000 power house addition.

KALAMAZOO, MICH.—Non-Ferro Founders Inc. recently suffered damages from fire estimated at $250,000.

MARINE CITY, MICH.—Detroit Gasket & Mfg. Co., 12640 Burt Rd., Detroit, has awarded a $156,000 contract to Cunningham-Rudy Co., 3087 W. Grand Blvd., Detroit, for construction of a factory. Architect is H. D. Ilgenfritz, 306 Hammond Bldg., Detroit.

TOWER, MICH.—Presque Isle Electric Co-operative plans to build a $325,000 hydroelectric power house and dam on Black river project near here. Engineer is J. &. G. Daverman Co., 301 Keeler Bldg., Grand Rapids.

MINNESOTA

PIPESTONE, MINN.—Northern States Power Co., 15 S. Fifth St., Minneapolis, has awarded a $350,000 contract to J. F. Pritchard Co., Fidelity Bldg., Kansas City, Mo., for construction of an electric generating plant here.

RED WING, MINN.—Pittsburgh Plate Glass Co., 616 S. Third St., Minneapolis, has awarded a $69,000 contract to McKenzie, Hague, Simmons Inc., 116 Flour Exchange Bldg., Minneapolis, for construction of a plant addition here.

ST. JAMES, MINN.—Northern States Power Co., 15 S. Fifth St., Minneapolis, has awarded a $200,000 contract to J. F. Pritchard Co., Fidelity Bldg., Kansas City, Mo., for construction of an electric generating plant here.

ST. PAUL, MINN.—W. H. Barber Co., 825 Thornton Ave., Minneapolis, plans a $500,000 project on Western Ave. to include warehouse facilities, boiler house, pump house, loading facilities and an office.

TRACY, MINN.—Northern States Power Co., 15 S. Fifth St., Minneapolis, has awarded a $250,000 contract to J. F. Pritchard Co., Fidelity Bldg., Kansas City, Mo., for construction of a booster electric plant.

NEW YORK

BAYSIDE, N. Y.—Sylvania Electric Products Inc., 500 Fifth Ave., New York, has awarded a $1 million contract to Austin Co., 19 Rector St., New York, for design and construction of research, development and administration buildings here.

OHIO

BEDFORD, O. — Ferro Chemical Corp., Northfield and Forbes Rds., has awarded a $60,000 contract to Leo W. Schmidt, 1000 Granger Rd., Garfield Heights, for construction of a chemical plant addition. Architects are Cutting & Ciresi, 4900 Euclid Ave., Cleveland.

CLEVELAND—Anchor Rubber Products Co., 1725 London Rd., has awarded a $129,000 contract to Norge Construction Co., 1742 E. 23rd St., for a plant addition. Architect is Leonard Broida, 1742 E. 23rd St.

CLEVELAND—Baker-Raulang Co., 2168 W. 25th St., has awarded a $195,000 contract to H. G. Slatmyer & Son Construction Co., 208 Lakeside Ave., for building a truck body plant addition.

INDEPENDENCE, O.—Fuller-Johnson Corp. is planning to build a factory and office building at routes 17 and 21 for manufacture of electric safety switches and road machinery.

LEESVILLE, O.—Earl J. Jones is completing plans for the complete mechanization of a coal mine near here.

PENNSYLVANIA

BUTLER, PA.—Keystone Pipe & Supply Co. plans to build a $135,000 shop and warehouse. Architects are Larsen & Dunnells, Century Bldg., Pittsburgh.

ELLSWORTH, PA.—Industrial Collieries Corp., Bethlehem, has awarded separate contracts totaling $125,000 for construction of a coal preparation plant.

JEANNETTE, PA.—Elliott Co. has awarded contracts totaling $300,000 to Westmoreland Construction Co., Greensburg, and Pittsburgh Bridge and Iron Co., Pittsburgh, for construction of a manufacturing building.

PITTSBURGH—American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, has awarded a $56,000 contract to Martin & Nettrour, 605 Pitt Bank Bldg., for a control building.

PITTSBURGH—Automatic Ignition Co. will build a $75,000 manufacturing building at 6360 Pennsylvanaia Ave. Engineer is J. F. Triggs, 1012 Jones Law Bldg.

SOUTH CAROLINA

CLEARWATER, S. C.—Langley Mfg. Co. will build a $585,000 warehouse and warehouse addition. Architects are Potter & Shackelford, Greenville.

TENNESSEE

COLUMBIA, TENN.—Monsanto Chemical Co. plans a $500,000 project to include a factory addition, service building and machine shop. Architect is Robert & Co., Bonal Allen Bldg., Atlanta, Ga.

GREENVILLE, TENN.—Moore Mfg. Co. will build a $60,000 factory.

MEMPHIS, TENN. — Kimberly-Clark Corp., Neenah, Wis., has awarded a contract to F. H. McGraw & Co., Hartford, Conn., for installation of two crepe wadding machines and auxiliaries in its plant here.

MEMPHIS, TENN. — Borg-Warner Corp., c/o Hanker & Heyer, architects, Title Bldg., proposes to build a $500,000 plant here.

MEMPHIS, TENN.—E. L. Bruce Co., c/o Furbinger & Ehrman, architects, U. P. Bank Bldg., has awarded a $100,000 contract to Dougherty-Liddel Co., 1370 McLendon St., for a manufacturing plant.

MORRISTOWN, TENN.—Staufer Chemical Co., New York, will construct a $2 million chemical plant here.

VIRGINIA

RICHMOND, VA.—Virginia-Carolina Chemical Corp. has awarded contracts totaling $450,000 to Mehring & Hanson Co., 12 H St., Washington, and Ft. Pitt Bridge Works, Keystone Hotel Bldg., Pittsburgh, for a plant here. Architects are Carneal & Johnston.

WEST VIRGINIA

ALLOY, W. VA.—Electro Metallurgical Co. will soon let a contract for over $55,000 for a plant addition.

CHARLESTON, W. VA.—Monsanto Chemical Co., 1700 S. 2nd St., St. Louis, has awarded a $125,000 contract to J. V. Pettyjohn Co., Lynchburg, Va., for a 1-story addition to its nitro plant.

FAIRMONT, W. VA.—Westinghouse Electric Corp., Maloney Bldg., Pittsburgh, has awarded a contract estimated at $216,927 to Dick Construction Co., 2532 Library Rd., Pittsburgh, for a motor manufacturing building.

FT. SPRING, W. VA.—Acme Limestone Co. has acquired machinery for construction of an additional grinding plant to cost approximately $125,000.

GLENDALE, W. VA.—Louis Marx & Co. has awarded a $300,000 contract to Gilmore, Carmichael & Olson Co., 1875 E. 55th St., Cleveland, for a 1-story, 200 x 500 ft. plant for making metal toys.

IDAMAY, W. VA.—Industrial Collieries Co., Bethlehem, Pa., has a $280,000 mine development project underway.

SOUTH CHARLESTON, W. VA.—Carbide & Carbon Chemicals Corp. has OHE approval for construction of an administration building estimated to cost $1,254,000.